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Computerized Preparation of Timber Management Plans: TEVAP2

by

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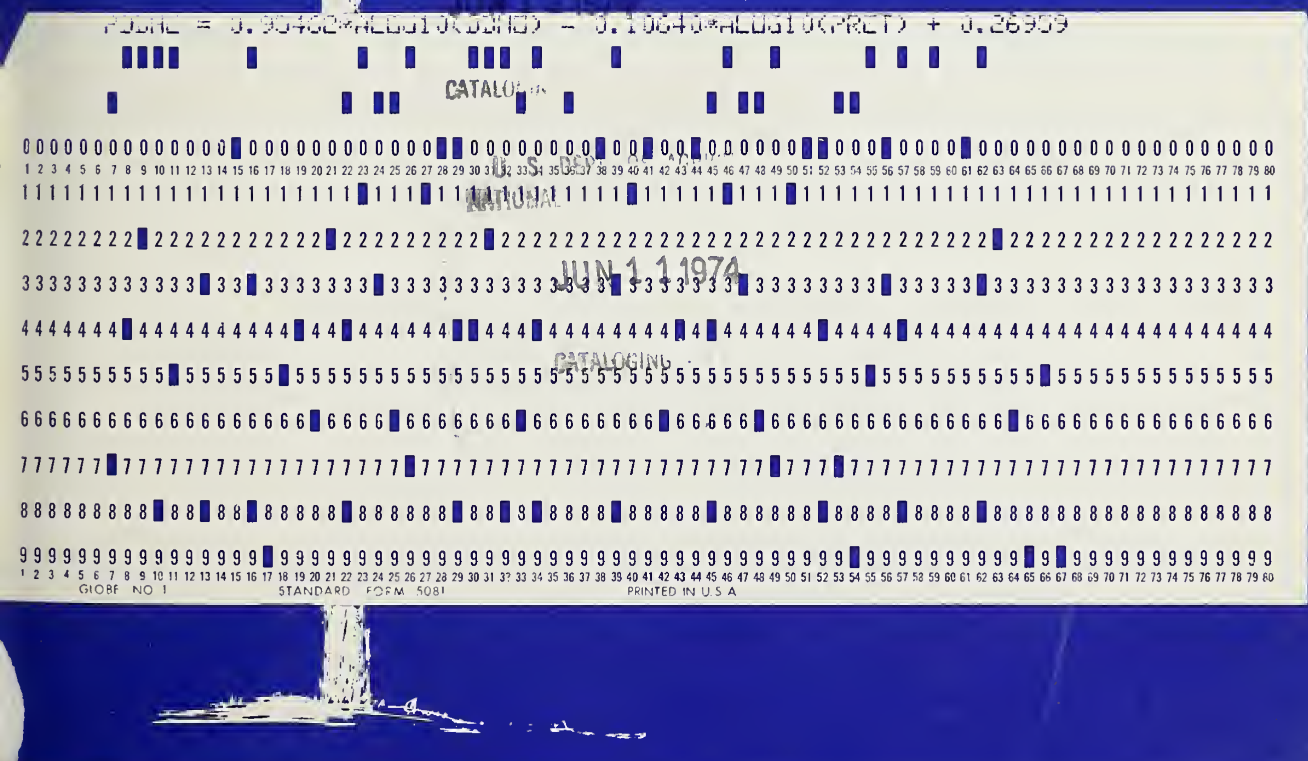
Forest Service



Abstract

Presents computer programs, written in FORTRAN IV, for analysis of inventory data, and computation of actual and optimum growing stocks and allowable cuts, and other values needed for forest management planning. Computed volumes and areas are summarized in a timber management plan. Effects of cultural operations and other changes are accounted for in computation of both actual and optimum conditions. Supersedes Research Paper RM-63.

Oxford: 624:U681.3. **Keywords:** Allowable cut, forest management, timber management, *Pinus ponderosa, Pinus contorta.*

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[1] *Central headquarters maintained at Fort Collins, in cooperation with Colorado State University.*

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The original version of these procedures was tested for 2 years on the Black Hills National Forest. The test team, headed by Professor Warren E. Frayer, Colorado State University, and Gary E. Metcalf, Black Hills National Forest, provided valuable suggestions for improving the procedures and computer programs.

Computerized Preparation of Timber Management Plans: TEVAP2

Clifford A. Myers

Introduction

Procedures and a computer program (TEVAP) to process inventory records and to write timber management plans (Myers 1970) were tested for 2 years on the Black Hills National Forest. Following successful completion of the test (Edwards et al. 1973), the procedures and program TEVAP were revised. Modified procedures and computer program TEVAP2 are presented here to supersede the 1970 publication, USDA Forest Service Research Paper RM-63. Some changes resulted from experience gained during the field test. These include increasing the number of blocks and working groups that can be accommodated, and changing program organization to simplify application to additional species. Other modifications reflect improved modeling of changes caused by silvicultural treatments (Myers 1971) and addition of the effects of dwarf mistletoe to appropriate growth equations (Myers et al. 1971, Myers et al. 1972).

As listed in appendix 1, TEVAP2 may be used for: (1) ponderosa pine (Pinus ponderosa Laws.) in the Black Hills of South Dakota and Wyoming, (2) ponderosa pine in Arizona and New Mexico, and (3) lodgepole pine (Pinus contorta Dougl.) in Colorado and Wyoming. It is quite easy to modify the program for use with other species. The changes and additions needed are explained in detail.

TEVAP2 was written in standard FORTRAN IV and tested on a CDC 6400 computer. In addition, it was run on a Univac 1108. Several FORTRAN statements were modified to match the rounding operations of the 1108, where proper execution by a CDC 6400 would not be affected.

Purpose

A forest operated as a business enterprise produces more than wood, forage, and other products. It is a prolific source of treatment and inventory records, reports, plans, maps, and other information. As with other businesses, efficient information processing is needed so that all relevant information can be used for decisionmaking.

Procedures for analyzing inventory and other data and reducing them to summary values useful in planning have been available for many years. These procedures have long provided information needed for management, and their validity and usefulness usually have been widely accepted. There are, however, important deficiencies in the ways data have been handled and in the conventional methods of computation described in forest management texts. Specifically, the use of maps and overlays, timber atlas and similar records, and desk calculators involve such difficulties as the following:

1. There is usually more information available than can be stored, retrieved, and analyzed efficiently.
2. Maps, photographs, overlays, and tabulations of numerical data freeze the information at one or a few points in time. Changes in recorded information in response to changes in the forest are expensive and time consuming.
3. Higher offices may ask for information already assembled in whole or in part for a previous report, but for which the worksheets are no longer available. Such requests can lead to much repetition in the assembly and analysis of data.
4. Information gathered for a specific purpose may be placed in a dead file after immediate needs are met. It may, however, have future value in management and decisionmaking, if it could be stored and relocated efficiently.
5. Timber management appears to proceed by steps, from management plan to management plan. Standing timber can and should be accounted for continuously, however, as is done for products entering and leaving a warehouse. There is danger of forgetting that a productive forest is a continuous, dynamic system.

High-speed computers with reasonably large memory capacity provide a means of efficiently extracting large amounts of information from an accumulation of records. Data can be stored, retrieved, and updated with relative ease. Computations, if preplanned, can be done so cheaply that higher offices can obtain all the reports desired without disrupting the work schedule of

local managers. There is no need to depend on plans that are expected to apply for several years despite fires, epidemics, and changes in economic conditions. A new plan, new maps, new cutting budget, and a new work schedule can be obtained as soon as recent changes in forest conditions have been recorded in the data file.

Program TEVAP2 (Timber EValuation And Planning), described herein and listed in appendix 1, provides a means of obtaining guidance quickly from a large volume of information. It is an example of the application of some information handling and analysis procedures to forest management. The program was developed around relationships that apply to timber production in even-aged stands because such relationships were available. It can be expanded, however, to include forage and other products and timber production in many-aged stands without change in the basic system.

With program TEVAP2, a manager can obtain a management plan whenever he wants one. A computer run, using updated records, can be made each winter during the planning period between field or growing seasons. Because large amounts of tedious computations and analyses are automated, management plans need not be prepared only at intervals of perhaps 10 years.

The term management plan, as used here, refers to the quantitative section of a conventional timber management plan. This material, in the form produced by TEVAP2 and in the way in which it is used, is perhaps better referred to as a management guide. Such information, regardless of how computed, serves as a guide or aid to management rather than as a plan, but the term "plan" has been used for many years. Following common modern practice, the transportation system and other general details can best be described in a report that covers the entire forest and provides information common to all resources. The output of TEVAP2 is, then, a specialized chapter to be added to this general report.

Programs such as TEVAP2 produce information that can be used for more purposes than control of current operations. They provide input data for programs that simulate operation of a forest under actual conditions. A manager can use the results of simulation to determine which one of several management alternatives will best meet his objectives (Chorafas 1965).

Data Handling and Management

Forest resource records are assembled from several sources. For timber, these sources are: (1) periodic forest inventory, (2) job reports prepared at the completion of each thinning, planting, sale, or other cultural operation, (3) area descriptions written after each fire or other catastrophe, and (4) stand and compartment analyses made as funds become available. Results of periodic inventories appear in management plans prepared after each inventory. Job reports and other data may be posted on the maps and tables of a timber atlas and summarized in annual reports. Although procedures vary among forest regions and classes of ownership, almost every item of information is used at some step in management and decision-making. Several operational computer programs for the analysis of periodic inventories illustrate how well the development of computation procedures has progressed.

It is unusual, however, for every item of information to be used for all appropriate purposes. For example, an individual fire report becomes part of the annual report on losses and suppression costs. It may then go to the protection file rather than to be processed as an important item of inventory data.

There are valid reasons why the maximum amount of information may not be extracted from each item of data. Problems related to storage and retrieval are frequently of great importance. These include the size of record files, problems of assembling the data for use, and reassignment of people who know what has been recorded and where to find it.

A forest manager is faced with other information problems that are less easily solved. There is little value in pooling records unless they can be updated to put them on a common time base. Also, data sufficient for a particular purpose may not be complete enough for more general use. A report on a thinning job may not contain sufficient stand or site data to permit its use in growth projections.

Procedures used in TEVAP2 to bypass some of the problems mentioned above are based on availability of a file of inventory records that can be updated as needed. This file contains stand data from many sources such as land books, job reports, and inventories. Stand descriptions prepared soon after thinning, fire suppression, or other activities provide excellent up-to-date inventory data and are used as such. Conventional inventories sample parts of a forest not already described in other records.

Inventory records for TEVAP2 are summaries of work reports and of conventional inventory records. They contain the specific items needed for program execution plus other items useful in sorting and summarizing the records. Overstory and understory components of a stand are described separately, if both are present. Computations can thus be made for stands being

regenerated by shelterwood or seed-tree systems. Growth can also be estimated for the many uneven-aged stands that may be described mathematically as two stands, overstory and understory.

Data used by TEVAP2 can be updated by computer once the basic relationships needed have been determined. How inventory records may be updated is explained in appendix 4.

Description of Program TEVAP2

Program TEVAP2 consists of: (1) a main program, (2) 16 subroutines that perform operations common to all species and working groups, and (3) a variable number of subroutines, each of which contains all the species-specific relationships required for one species. For brevity, the program listing in appendix 1 includes only three species-related subroutines. Any or all of the three may be replaced by following the instructions in the section headed Basic Information Used. Alternatively, any number of species-specific subroutines may be added. Three subroutines (MAPS, AREA1, and AREA2) provide alternative ways of computing areas, and only one of them is used during a single run. A single, complete program run thus uses the main program, 14 general subroutines, and at least one species-specific subroutine.

Content and purpose of each routine are described in the following sections. Variable names are defined in the program listing in appendix 1 and in the list of contents of the data deck. The list of data cards (in the section "Data Deck for TEVAP2") also reports the number of cards needed and the sequence in which they are read. An example of an application of TEVAP2 (appendix 2) further explains the program.

Numbers of blocks, working groups, site classes, and age classes that can be accommodated are limited by the dimensions assigned in COMMON and DIMENSION statements. As listed in appendix 1, each type of subdivision has a different number of units so the dimensions and loops that pertain to each subdivision can be identified. Restrictions to be observed, unless appropriate changes are made, are as follows:

1. The working circle may be subdivided into one to seven blocks. A block may be an isolated unit of the working circle or one or more basic administrative units, such as Ranger Districts. There must be at least one block in the working circle for program execution.

2. A maximum of five working groups may be defined without program modification. A working group consists of stands of the same forest type and managed under the same silvicultural system (Chapman 1950). It may sometimes be necessary to exclude a portion of the working circle from allowable cut computations. At the same time, all the other values may be needed to prepare impact statements and for other use. Examples of such special situations are stands on areas being examined for possible wilderness classification. In such cases, a working group named DEFERRED can be created. Statements are already in TEVAP2 to bypass DEFERRED working groups in computing allowable cut totals. If more than one species is involved, the excluded working groups may be named DEFERRED1, DEFERRED2, etc., and the area where they occur designated as a separate block.

3. Provision is made for 35 vegetative or use types. As used for the example in appendix 2, they are as follows:

Types 1- 5 - Five broad age classes within the first working group.
Types 6-10 - Five age classes within the second working group.
Types 11-15 - Five age classes within the third working group.
Types 16-20 - Five age classes within the fourth working group.
Types 21-25 - Five age classes within the fifth working group.
Type 26 - Deforested areas covered by brush.
Type 27 - Deforested areas covered by grass.
Type 28 - Recreation areas not included in computations of volume or allowable cut.
Type 29 - Rock outcrops and other areas where plant products cannot be produced.
Type 30 - Areas covered by brush that will not be converted to forest.
Type 31 - Areas with grasses and other herbaceous species that can be managed for forage production.
Type 32 - Areas of other ownership.
Type 33 - Areas included in cleared rights-of-way along roads, power lines, etc.
Types 34-35 - Available for assignment.

4. Stand ages may be grouped into 15 or fewer 10-year age classes. This classification is in addition to, but correlated with, the use of age in the forest type definitions.

5. Ten-foot site index classes from 10 to 140 are used to group various volume and area data by productivity classes.

6. Provision is made for up to 30 subcompartments per compartment. This specification

need be considered only if subroutine MAPS is the source of area data. Following long-established practice, a compartment is the smallest permanent unit and is useful for record keeping. A subcompartment is a temporary subdivision equivalent to a stand, and is an area reasonably uniform in such characteristics as site quality, stand structure, and treatment (Chapman 1950).

Main Program

The main program calls 13 subroutines to execute five sets of operations in the following order:

1. Read values of control variables and initialize variables applicable to the working circle.
2. Compute area totals and subtotals.
3. Compute optimum growing stocks and yields.
4. Compute present and future volumes, periodic yields, and other values useful in timber management.
5. Summarize computations and print a timber management plan.

TEVAP2 provides three alternatives for the second set of operations, computation of areas. One alternative (MAPS) requires complete forest subdivision plus compartment maps on punched cards or magnetic tape. Another (AREA2) requires only a knowledge of total area of the working circle and of each nontimber vegetative or use type. The third alternative (AREA1) represents one intermediate possibility, knowledge of type areas by compartments but with subcompartments not designated or mapped. A new routine may replace any of the three examples if still another level of information is of interest.

Ten subroutines called by the main program and one routine called by another subroutine write one or more pages each. Pages are identified by a type number such as "page type 3," as shown in appendix 2. Each type number, except type 5, designates a specific page layout. Pages are not numbered consecutively because page requirements will vary with size of the working circle, number of working groups, and area alternative used. The last three pages printed are designated types 1, 2, and 3 since many managers prefer that summary pages be the initial pages of a plan. Pages of Z-fold paper can be separated and placed in proper numerical order. Temporary storage on scratch tapes can be used to reorder pages for output onto film.

Subroutine BASIS

BASIS reads data card types one to eight (p. 12) to enter values of control variables that do not change during program execution. With many variables, a value is entered for each working group of the working circle. Some variables quantify management decisions and economic limitations. These include frequency and intensity of thinning, rotation lengths, regeneration system, and minimum volumes for commercial operations. Other variables describe regeneration goals in terms of the average stand diameter and number of trees per acre expected at time of the first thinning. Goals are described for each site class of each working group. Since the number of site classes may not be known before the inventory records are processed, it is necessary to include data cards of types 6 and 7 for every 10-foot site class from the lowest to be managed in the working group up to at least the highest expected. The last type 6 card for each working group is blank to stop further reading for that working group, unless class 140 is represented by data cards. A blank type 6 card is not followed by a type 7 card.

Values to be assigned to the control variables can be obtained from analysis of past records, measurements on temporary plots, and from computer simulations that permit examination of alternatives (Myers 1971, 1973).

Several of the values read by BASIS are printed on page type 4 to provide a partial record of the control variables.

Subroutine INIT

INIT is called by the main program to assign an initial value of zero to many subscripted and unsubscripted variables. These variables are later used to describe major subdivisions of the working circle and usually appear in several subroutines.

Subroutine SCAN

SCAN executes the first of two readings of the inventory records on type 9 data cards or card images. Totals are then compiled as follows: (1) number of records by block and type (broad age classes within a working group), (2) area of each cover type by block and type, (3) nonstocked areas by block and site class, (4) area in each working group by block and site class, and (5) area, by block and type, below minimum site class for management. TEVAP2 will

handle inventory records with or without a known area in acres, or a mixture of the two. If the area field of a record reports an acreage, the data describe a stand of that size. If no area is given, the data apply to an inventory plot. SCAN sums reported areas by each combination of subdivisions listed above. Otherwise, numbers of plots of each classification are obtained. Numbers of plots are converted to equivalent areas by later subroutines.

SCAN determines the number of site index classes represented in the inventory records of each working group. Number of site classes controls the number of yield tables produced by YIELD. Subroutine YIELD, in turn, computes overwood volumes and their growth rates, if seed tree or shelterwood systems are used. These values are thus available when needed for processing of the inventory records by subroutine GOT.

Subroutine MAPS

Subroutine MAPS is one of three alternative routines used to compute areas. Items needed are (1) complete forest subdivision to the subcompartment, and (2) compartment maps that show types and subcompartments. The sequence of operations is explained by COMMENT statements in the program listing (appendix 1).

MAPS accepts map data in the form of arrays of map codes on punch cards or tape. These are labeled card types 12, 13, and 14 in the list of contents of the data deck. The form of input is specified by assignment of logical unit 3 to the card reader or to a tape drive. Array sizes, related DIMENSION statements, the system of map codes, and the area represented by one square of the map grid may be changed as desired.

Coding of types (KTYP) and subcompartments (KSUB) follows a procedure used for demographic and other studies. In the example of appendix 3, each section of 640 acres on a forest stand map was subdivided into 144 small squares. Each square of 4.444 acres (map 4 inches to 1 mile) was then assigned the code number of the predominant type. Portions of sections were combined to reproduce the entire compartment. Subcompartments were then designated and coded on the basis of type codes and field data. In the forest used as an example, all compartments fit into squares three sections on a side, and could be represented by arrays of 36 by 36 2-digit code numbers. One west-to-east row of coding occupied the first 72 columns of a punch card. As many cards as necessary, but not more than 36, were punched to complete a type or subcompartment map for a compartment. All cards were run through an editing program to locate errors. This included a check that each subcompartment contained only one type. Corrected maps and control variables were then recorded on magnetic tape, using WRITE statements equivalent to the READ statements for data card types 12, 13, and 14.

The mapping procedure used is intended to illustrate the types of information needed and what can be done with them. In actual applications, more efficient procedures for coding and data storage may be available. Hand coding, for example, can be replaced by use of equipment that reduces map areas to digitized form. Forest managers can obtain procedural guides from the many applications of computer graphics to studies of urban problems and land use (Shahar 1970).

MAPS contains the only machine-dependent operations in program TEVAP2. Map code numerals are converted to display code so blank areas of the maps will not be filled with minus zeros. Converted numbers are then printed with R format. Program statements must be modified if available equipment uses a different display code than the CDC 6400 used to test the program.

Two pages, types 5 and 6, are printed by MAPS. The form of page type 5 is optional and is specified by the value read initially for the variable MAP from data card type 11. Type and subcompartment maps and related area totals may be printed, if desired. Two pages are produced per compartment, one with the type map and one with the subcompartment map (appendix 3). Alternatively, only type and subcompartment areas may be printed (MAP = O). Page type 6 reports block and working circle totals, and has the same format as the equivalent page produced by AREA1 and AREA2 (appendix 2).

Type and subcompartment boundaries are continually subject to change according to the usual rules for forest subdivision (Chapman 1950). The map file must, therefore, be updated prior to each computer run with subroutine MAPS. Cultural operations, growth into the next age class, and fire or other catastrophe create need for recoding.

Subroutine AREA1

Subroutine AREA1 is another of the three alternative routines that compute areas. It is used if compartments have been established and if type areas within compartments are known. It is assumed that subcompartments have not

been established, or that compartment maps are not available. AREA1 illustrates one possible situation in the range of degrees of administrative complexity between the limits served by MAPS and AREA2.

Type areas by compartment — inputs to the subroutine from data card types 15 and 16 — are summed to obtain total acres by working group, by block, and by various other classifications and combinations thereof. These sums are stored in unlabeled COMMON blocks for use by later routines. COMMENT statements in the program listing, appendix 1, explain the operations involved.

AREA1 prints type areas of each compartment on one form of type 5 pages (appendix 3) and prints a type 6 page to report block, working group, and working circle totals. The type 6 page is the same as that produced by MAPS and AREA2 (appendix 2).

Subroutine AREA2

Subroutine AREA2 is the third of the routines used to compute areas (appendix 1). It is used if compartments have not been established, or if type areas within compartments are not known. This is the situation assumed for the example in appendix 2. Areas of blocks and of nonforest types are read from data card types 17 and 18.

Type areas are computed from total production area, including nonstocked, and inventory information already compiled by subroutine SCAN. Areas of nonforest types and of unregulated stands in recreation areas are subtracted from working circle area to get the area available for timber management. Stands of known area were assigned to the appropriate block and type by SCAN and are now subtracted from equivalent total areas. Remainder of the production area is allocated to forest types, by block, in proportion to the number of inventory records without area from each type.

Type, working group, and block areas are recorded on pages type 5 and 6 (appendix 2).

Subroutine LAND

LAND completes the processing of the areas of blocks, working groups, and types. Area of the working circle not in subcompartments of known area is computed by: (1) working group and block, and (2) block and type. Total area of all timber types, excluding nonstocked, and the area of nonstocked land in each block are then computed.

Acreages not in subcompartments of known area and record counts made by SCAN are used to complete the computations. Nonstocked area is determined for each site class of each block. Areas of each site class in each block and working group are then computed.

LAND prints page type 7 as a record, by site class and block, of the nonstocked area and the area in each working group.

Finally, the deforested area is allocated to working groups by blocks and site classes. Each working group is assigned a percentage of the deforested area equal to the proportion of the area of the working group to total timbered area. These adjusted areas are later used to compute optimum growing stocks and allowable cuts.

Subroutine GOAL

Subroutine GOAL computes the optimum conditions that would exist if all stands were thinned on schedule to a specified level, with a balanced series of age classes already established. Values needed to make these computations come from other routines. Management decisions based on experience, results of simulations, and statements of policy are entered by BASIS. Acres in each site index class of each working group are computed by LAND from area data and the inventory file read by SCAN.

Most computations are executed once for each site index class of each working group. Major operations, in the order performed for a site class, are as follows:

1. Subroutine YIELD is called to compute and print a yield table.
2. Annual volumes per acre, computed by YIELD, are printed on page type 9. These volumes, in board feet and cubic feet, are later summed to obtain optimum growing stocks. Recording the volumes on page type 9 preserves them for other use after the management plan has been printed.
3. Mean annual increment at rotation age is computed for each site class of each working group. If appropriate, tree felling ages do not equal rotation ages but include the effects of delays in obtaining regeneration and the period seed trees or a shelterwood may be left over the new crop. Mean annual increments computed from yield table volumes are later used as "normal" increments in application of Heyer's formula:

$$E = WZ + \frac{WV - NV}{a}$$

where: WZ is mean annual increment, WV is actual growing stock, NV is normal growing stock, and a is the adjustment period (Burger 1920).

4. GOAL calculates for each 10-year age class the number of acres and the growing stock resulting from a balanced series of age classes. The results are printed on page type 10. Area regulation is assumed for these computations; annual cut for a site class of a working group is area divided by rotation length. Acres with stands of zero age are listed as such if delays in regeneration are expected with clearcutting. Volumes of seed trees or shelterwood are included in appropriate age class totals if these regeneration systems are used. Tables of pages type 10 in appendix 2 show examples of working groups managed by shelterwood and clearcut systems.

5. Annual cuts that might be obtained with a balanced series of age classes and optimum stand densities are computed for each working group. Volumes from intermediate, regeneration, and final cuts are not combined into working group totals until subroutine SUMRY is called. Volumes of final cuts result from the final removal of overwood with seed tree or shelterwood systems. All other cuts for purposes of stand regeneration, including clearcutting, are classed as regeneration cuts.

After processing of all site classes is completed, GOAL prints a record of optimum volumes by site classes on page type 11 and area equivalents in standard acres on page type 12. One page of each type is produced for each working group.

Subroutine YIELD

YIELD is called by GOAL to compute and print a yield table for each site index class of each working group. Prediction equations and other relationships needed are obtained by calls to subroutines CUTS and WORKGP. Information used is described in the section headed Basic Information Used.

A yield table for a site class of a working group incorporates management objectives relating to frequency and intensity of thinning and other matters. It serves as a "normal" or standard for stands of that classification. A yield table represents the goal toward which operations are directed. It is possible to produce many yield tables for a site class, which emphasizes that there cannot be a single table for managed stands of a species and site class. The term "managed" indicates that there are additional variables to be considered; one table cannot account for all the possibilities. Each table is useful only where goals and management decisions are as specified for its computation.

Details of field work and computations needed to produce yield tables have been published elsewhere (Myers 1971, Myers et al. 1971, Myers et al. 1972). Subroutine YIELD is most of what is used elsewhere as a separate program. The yield tables are printed as page type 8.

Volumes per acre at each year of stand age are obtained by interpolation between yield table values. These volumes, in board feet and cubic feet, are printed by subroutine GOAL.

Additional computations are performed by YIELD if seed tree or shelterwood systems are used for stand regeneration. Volumes of the residual overwood remaining after each regeneration cut, in board feet and cubic feet, are obtained from the yield tables. Growth rate of the residual overwood during the period it remains standing is also computed.

Subroutine CUTS

Subroutine CUTS estimates average stand diameter after a thinning from below that includes removal of occasional larger trees. Estimated diameter after thinning (DBHE) is computed from diameter before thinning and the percentage of trees to be retained. Some of the relationships used, described in the section headed Basic Information Used, are contained in the species-specific subroutines. Successive percentages of retention are tested until d.b.h. after thinning, number of trees retained, and residual basal area agree with the growing stock goal specified by THIN(I) or DLEV(I). Each call by YIELD or GOT is preceded by a statement that specifies the thinning level (REST) to be used.

Growing stock levels specify the basal area to be left after thinning in relation to average stand diameter (Myers 1971). Definition of several levels provides for alternative thinning intensities. Each level is named by the basal area to be left when average diameter is 10.0 inches or larger. Residual basal area increases with stand diameter until the diameter reaches 10.0 inches. Thereafter, basal area remains constant for any one stocking level. Subroutine CUTS therefore has two iterative loops so a full range of diameters, with both variable and constant basal area, may be accommodated. Limiting d.b.h. for selection of loops is 10.0 inches minus the smallest change expected from usual thinning practice.

Subroutine WORKGP

Subroutine WORKGP is included solely to serve as a switching center. Its presence permits TEVAP2 to be used with many species and working groups, and for all species-specific statements to be grouped into separate subroutines for convenient program modification. WORKGP is called by YIELD, CUTS, or GOT, as needed. The species number for the working group, SPNUM(I), is used by WORKGP to call the appropriate set of species-specific relationships. For example, if SPNUM(I) equals one, the call will be to subroutine BHPP, species-specific statements for Black Hills ponderosa pine, with the program organized as in appendix 1.

BASIS reads both an identifying number for each working group and a number for the species in the working group. This combination permits flexibility in silvicultural specifications for working groups without lengthening the program. For example, part of the area of a given species may be managed for wood fiber with two-cut shelterwood and a short rotation if high intensity recreation use is not a factor. Elsewhere, the species could be managed with three-cut shelterwood and a longer rotation to provide pleasing variety in the landscape. The identification procedure used in TEVAP2 keeps data from the two working groups separate at all times. By assigning the same species number to both working groups, however, only one species-specific subroutine is needed.

For brevity, the listing of WORKGP in appendix 2 calls only three species-specific subroutines, and has dummy statements for two more. Any or all of these five may be replaced by calls to subroutines that contain statements for other species. The GO TO statement may be expanded to provide for the addition of many more species-specific subroutines to TEVAP2. One copy of TEVAP2, stored in one computer, can thus serve all the working groups and species of an entire region.

Subroutine GOT

Subroutine GOT processes the set of inventory records (data card type 9) to obtain present and future volumes and other values. Controls described in the following paragraphs apply to all computations.

Inventory records have a number in the ACRE field if the tree and site index values are amounts per acre averaged over a specific stand. The ACRE field has a blank or zero if the record is for a sample plot that describes a portion of the "unknown" forest area. In terms of recent National Forest inventories, the working circle may be at stage one (sampling the working circle), at stage two (compartment analysis), or with parts of the working circle at each level.

Volume computations are bypassed for records from: (1) deforested areas, (2) areas below minimum site index for management, (3) trees too young or too small to have more than a few merchantable cubic feet per acre, and (4) stands below minimum age for inclusion in growing stock totals. With these exceptions. operations performed on individual inventory records produce the following values:

1. Present basal areas and volumes per acre.
2. Basal areas and volumes at the end of the planning period.
3. Growth expected during the next planning period, in cubic feet and board feet. Thinnings are computed as though done at the beginning and end of the period, and average growth is determined. It is assumed that about equal areas will be thinned each year of the period.
4. Potential yields during the next planning period if all areas are treated as specified by WORK on the inventory records. Half the potential growth of stands to be cut during the period is added to potential yields. Volumes are not included in total yields if they are less than the minimum commercial cuts specified by values of variables COMBF(I) and COMCU(I).

Two variables define time periods. TIME is the number of years in a planning period. It is the period considered in assigning the WORK index that identifies stands in need of treatment in the near future. Values of WORK that relate to computations in GOT are defined at the beginning of appendix 1. RINT(I) is the number of years for which the equations predict future d.b.h., height, and stand density. RINT(I) may vary among working groups. TIME must be equal to or a multiple of RINT(I).

Two sets of volume totals are maintained for block, age, and other subdivisions until all inventory records are processed. One set reports volumes of stands of known area. Volumes per acre are multiplied by area to obtain stand volumes for addition to the totals. The second set reports volumes from records with no entry for area in the ACRE field. Volumes per acre are summed for each subdivision specified in the program. Final volumes are totaled by subroutine SUMS.

Inventory records used by SCAN and GOT can be listed according to the work to be performed (WORK) and the fiscal year (FISC) in which it is scheduled. This listing would provide

information on where stands to be treated during the next management period are located. Such a list is not made by TEVAP2, but could be produced by a separate run of the inventory records. Locations, WORK index, and fiscal year appear on the inventory records of data card type 9.

Subroutine SUMS

Sums completes the processing of volumes and prints a record of the computations. For records without a value in the ACRE field, SUMS will: (1) compute separately for each block the proportion of the total area of a type represented by one sample plot, (2) use this area to convert the sum of acre volumes to actual volumes of that portion of the working circle without ACRE records, and (3) add volume totals, with and without ACRE records, to obtain actual totals for various subdivisions of the working circle.

Summaries of present volumes are printed on pages type 13 and 14. Working circle totals are subdivided by blocks and timber types. Many computed values are not reported at this point in the program, but are printed by the subroutines described below.

Subroutine SUMRY

SUMRY performs several operations:

1. Computes differences between actual and optimum growing stocks for each age class of each working group.
2. Prints page type 3 as a record of actual and optimum growing stocks and of the differences between them. One page is printed for each working group.
3. Summarizes the number of acres coded for treatment and the volumes obtainable from thinning, regeneration cutting, and other operations during the next management period.
4. Summarizes the annual cuts obtainable with balanced distribution of age classes (equal area in each age class) and optimum growing stock. Totals are obtained for each working group and for the working circle. Totals for the working circle do not include volumes possible from working groups named DEFERRED.
5. Computes the annual cuts obtainable during the next management period if all operations called for by the WORK index are performed.
6. Computes annual cut by Heyer's formula. Total annual cut for the working circle will not include any amount contributed by any working group named "DEFERRED." It is thus possible to have all the area and volume information of a "deferred" working group but to omit the working group from computations of allowable cut.

Subroutine GIDE1

Subroutine GIDE1 prints page type 1 as a summary of computations made by the entire program. Major items of page type 1 are the statements of the allowable cuts computed by SUMRY. As listed in appendix 1, page type 1 contains only a few of the items that could be assembled on summary pages.

TEVAP2 computes and reports four annual cuts, as examples of what can be done by this or similar programs. The types of cut are:

1. Idealized cut based on area regulation and a balanced series of age classes. Components of this cut are computed by GOAL and summarized by SUMRY.
2. Potential cut if all operations called for by the WORK index are performed, without regard to other restrictions. Periodic cuts are computed by GOT and SUMS and converted to annual volumes by SUMRY.
3. Annual cut computed with the modification of Heyer's formula and an adjustment period of ADJ(I) years. Growing stock volumes computed from mean annual increment, as called for by the formula (Burger 1920), are not used. Instead, actual and optimum growing stocks computed by GOAL and SUMS are used by SUMRY to compute the desired values. Initial term of the formula is mean annual increment obtained from the idealized yield tables produced by YIELD.
4. Current annual cut with area regulation.

Convenient comparisons of annual cuts provided by page type 1 suggest another use of programs such as TEVAP2. They can be used as tools for research on the principles of allowable cut determination. For example, various modifications of the Heyer formula would yield quite dissimilar results. Periodic annual increments, PAIBD(I) and PAICU(I), are computed by SUMS for use in such comparisons.

Subroutine GIDE2

GIDE2 prints page type 2, a summary of the potential work load and yield for the next management period. Separate values are printed for each combination of block, cover type, and operation to be performed. Bases for the values

are the WORK codes in the inventory records and the computations performed by GOT and SUMS. If all entries for a particular operation would be zero, no record of that type of operation is printed. For example, no inventory record used to produce appendix 2 has a WORK code of 3. No statement of volumes to be salvaged, therefore, appears on page type 2 of any working group. Subroutine GIDE2 does, however, contain the necessary FORTRAN statements to print a salvage record, when needed.

Species-Specific Subroutines

The listing of TEVAP2 in appendix 1 contains three species-specific subroutines: (1) BHPP for ponderosa pine in the Black Hills of South Dakota and Wyoming, (2) LDGP for lodgepole pine in Colorado and Wyoming, and (3) SWPP for ponderosa pine in Arizona and New Mexico. As explained in a previous section, as many more species as desired can be accommodated. The computed GO TO in subroutine WORKGP must be expanded as far as necessary by the addition of more species numbers. Each call to a subroutine is labeled with the appropriate species number, SPNUM(I), to be entered on data card type 4. Then, a new subroutine is added to TEVAP2 for each new species, corresponding to the calls added to subroutine WORKGP. There will be no need for changes in subroutines YIELD, CUTS, or GOT if the arrangement of one of the listed routines is followed. Relationships needed are described in the section headed Basic Information Used.

Operations performed by the 12 sections of a species-specific subroutine are listed in order, below. Any section needed during program execution is specified by assigning a value to the switching variable IJ just before calling subroutine WORKGP. A computed GO TO at the beginning of each species-specific subroutine then selects the appropriate section. Some sections compute values of only one variable; others compute values of several variables from a series of species-specific statements.

The numbered sections compute:

1. Total cubic feet per acre in the overstory and understory, as used by subroutine GOT.
2. Factors to convert total cubic feet to other units. Factors for cubic feet to a 4-inch top and for board feet Scribner Rule are computed by the subroutines in appendix 2. This section is called by YIELD and GOT.
3. An inventory record to obtain volume and other stand measures at the end of the projection period, for use by subroutine GOT.
4. Future volume and other measures of an unthinned understory, from all appropriate inventory records, if the overstory is removed at the beginning of the projection period. This section is called from GOT.
5. Average stand d.b.h. after thinning to any specified residual percentage of trees. Thinnings are simulated by subroutine CUTS, which is called by YIELD and GOT.
6. Merchantable cubic feet obtainable from tops and small trees as a byproduct of a sawlog cut, for subroutine GOT.
7. Stand volume after thinning at the beginning of the management period and after thinning at the end of the period. These values are used by subroutine GOT.
8. Volume per acre and other measurements at the end of the management period, of a stand thinned at the start of the period. The section is called from GOT.
9. Average height of dominant and codominant trees and of volume in cubic feet, before thinning, for YIELD.
10. Average height of dominants and codominants and of volume in cubic feet, after thinning. This computation differs from section 9 in that height is not based on age and site index, but is height before thinning plus an adjustment to show the effect of thinning. The call is from YIELD.
11. Average stand d.b.h. at the end of the projection period, for YIELD.
12. Mortality during the projection period as a percentage of the number of live trees at the beginning of the period. This section is called by YIELD.

It will often be possible to use single equations for diameter and height growth, with no distinction between "good" stand density and a wide range of densities. Single equations were not used for the species represented in appendix 1; the computations in TEVAP2 parallel those in other available management tools (Myers 1971, Myers 1973).

Data Deck for TEVAP2

Eighteen types of punch cards or card images, listed below, are used to enter initial values of variables into computer memory. In this section, the word "card" may refer either to a standard 80-column punch card or to a card image on magnetic tape. Records that can best be handled by tape are identified in the descriptions of the subroutines.

In the following list, type numbers with asterisks designate alternatives (types 11 to 18, inclusive). Only two to four of these types need appear in the data deck for a single run of the program. Basis for choice is the area subroutine (MAPS, AREA1, AREA2) selected for call by the main program. All cards with type numbers not followed by asterisks must be included in the data deck so READ statements will be executed properly. Data cards are read in order of type numbers with three exceptions: (1) card type 9 is read twice, (2) as many sets of card types 4, 5, 6, and 7 are read as there are working groups in the working circle, and (3) unneeded cards of optional types 11 to 18 are omitted.

Card types 1 to 8, inclusive are read by BASIS. Types 1, 3, and 8 consist of one card each; type 2 consists of 5 cards. One card each of types 4 and 5 must be provided for each working group. Up to 14 cards each of types 6 and 7 must be added to the data deck for each working group. There must be one set of types 6 and 7 for each 10-foot site index class of each working group, from POOR(I) to at least the highest site class expected. The last card of these 6-7 sets must be a blank type 6 card if not all site classes through 140 are represented by data cards.

With two working groups, the sequence of cards read by BASIS would be:

1. One card type 1.
2. Five cards type 2.
3. One card type 3.
4. One card type 4 for working group 1.
5. One card type 5 for working group 1.
6. One card type 6 for site class POOR(1) of working group 1.
7. One card type 7 for site class POOR(1) of working group 1.
8. Alternate single cards of types 6 and 7 for additional site classes of working group 1. Last card is a blank type 6 if not all site classes through 140 are represented.
9. One card type 4 for working group 2.
10. One card type 5 for working group 2.
11. One card type 6 for site class POOR(2) of working group 2.
12. One card type 7 for site class POOR(2) of working group 2.
13. Alternate single cards of types 6 and 7 for additional site classes of working group 2. Last card is a blank type 6 if not all site classes through 140 are represented.
14. One card type 8.

Subroutine SCAN reads card types 9 and 10 after BASIS has read card type 8. Types 9 and 10 will be read again later in the program. A REWIND command is in SCAN for use if the inventory records are on magnetic tape.

Subroutine MAPS, if used, reads card types 11 to 14, inclusive. One card of type 11 is needed to enter values that apply to all compartments. A set of cards for one compartment consists of type 12 (one card), type 13 (up to 36 cards), and type 14 (up to 36 cards). These sets are read in the sequence 12, 13, 14, 12, 13, 14, etc. until the number of sets or compartments (NCMP) on card type 3 has been processed.

AREA1, if used, reads card types 15 and 16. A set of cards for one compartment consists of one card of type 15 and the four cards that make up type 16. Sets are read in the sequence 15, 16, 15, 16, etc. until the number of sets or compartments (NCMP) on card type 3 has been processed.

Subroutine AREA2, if used, reads card types 17 and 18. First, one card of type 17 with one to seven block areas is read. Areas are in the order: block 1, block 2, etc., to block 7. One card of type 18 is then read for each entry on card type 17. Cards of type 18 must be arranged in the order block 1, block 2, and so forth, up to the highest block number needed, to match the order in which block areas will be read from card type 17.

GOT reads card types 9 and 10, the inventory records already read once by subroutine SCAN. The number of cards or card images of type 9 is determined by the number of inventory plots measured and/or by the number of subcompartments for which inventory data are known. To avoid counting of inventory records prior to program execution, a record (type 10) with 99 punched for block number follows the type 9 records. This terminates processing of the inventory and moves control to another subroutine. Fields for KOMP, ISUB, and ACRE on an inventory record will be blank when the forest is not completely subdivided or subdivisions are not used for the record.

Card type	Read by	No. of cards	Variable name	Columns	Format	Description of variable
1	BASIS	1	OPTION	1-5	A5	Name of area subroutine (MAPS, AREA1, AREA2) to be used.
			ICT9	6	I1	Number of logical unit for input of inventory records.
			FORET(I)	7-80	18A4,A2	Name of the forest or working circle.
2	BASIS	5	TYPNM(I,J)	1-80	8(5A2)	Brief name for each vegetative or use type, ten characters each.
3	BASIS	1	NBK	1-4	I4	Number of blocks in working circle. Must be at least one.
			NCMP	5-8	I4	Number of compartments in working circle. Zero with AREA2.
			NWGP	9-12	I4	Number of working groups in the working circle.
			MIN	13-16	I4	Minimum age for inclusion of stand volume in growing stock.
			BFMRCH	17-20	F4.2	Minimum M bd. ft. per acre for inclusion in growing stock.
			TIME	21-24	F4.2	Number of years in planning period.
4	BASIS	1 per working group	WGPNM(I,J)	1-12	3A4	Name of working group I, preferably from a standard list of working groups.
			WGNUM(I)	13-17	F5.0	Standardized number of the working group named above.
			THIN(I)	18-21	F4.1	Growing stock level for initial thinning in working group I.
			DLEV(I)	22-25	F4.1	Growing stock level for cuts after initial thinning, working group I.
			POOR(I)	26-29	F4.1	Minimum site index to be managed for timber, working group I.
			COMBF(I)	30-33	F4.1	Minimum commercial cut in M bd. ft. per acre, working group I.

Card type	Read by	No. of cards	Variable name	Columns	Format	Description of variable
			COMCU(I)	34-38	F5.2	Minimum commercial cut in hundreds of cu. ft. per acre, working group I.
			ADJ(I)	39-42	F4.1	Length of period of adjustment in allowable cut formula, working group I.
			DELAY(I)	43-46	F4.1	Years between clearcutting, if used, and regeneration; working group I.
			RINT(I)	47-50	F4.1	Number of years for which the equations predict growth, working group I.
			CUCY(I)	51-54	F4.1	Years between intermediate cuts, working group I.
			SPNUM(I)	55-58	F4.0	Number assigned to a species of working group I so appropriate set of species-specific relationships can be called. One of the numbers in computed GO TO of SUBROUTINE WORKGP.
5	BASIS	1 per working group	WGPDES(I,J)	1-80	20A4	Statement of regeneration system, etc. used for working group I.
6	BASIS	up to 14 per working group	REGN(I,1,J)	1-4	F4.0	Stand age at which first regeneration cut will occur in working group I, site class J. Never zero or blank, as this is rotation length for clearcutting.
			VLLV(I,1,J)	5-10	F6.3	Percentage of previous growing stock level to be left at first regeneration cut in working group I, site class J. Enter zero for clearcutting.
			INVL(I,1,J)	11-13	I3	New interval between cuts in effect after first regeneration cut in working group I, site class J. Enter zero for clearcutting.

Card type	Read by	No. of cards	Variable name	Columns	Format	Description of variable
			REGN(I,2,J)	14-17	F4.0	Stand age at which second regeneration cut, if any, will occur. Removal of seed trees or second cut of shelterwood. Working group I, site class J.
			VLLV(I,2,J)	18-23	F6.3	Percentage of previous growing stock level to be left at second regeneration cut, working group I, site class J. Previous level includes effect of VLLV(I,1,J). Enter zero if no third cut.
			INVL(I,2,J)	24-26	I3	New interval between cuts in effect after second regeneration cut in working group I, site class J. Enter zero if no third cut.
			REGN(I,3,J)	27-30	F4.0	Stand age at which third regeneration cut, if any, will occur, working group I, site class J. Final cut of 3-cut shelterwood.
7	BASIS	up to 14 per working group	AGETH(I,J)	1-5	F5.1	Initial age in yield table for working group I, site class J. Age at which first thinning will be done.
			DENTH(I,J)	6-10	F5.1	Number of trees per acre expected just before thinning at age AGETH (I,J). Working group I, site class J.
			DBHTH(I,J)	11-15	F5.1	Average stand d.b.h. expected at age AGETH(I,J) with density DENTH(I,J). Working group I, site class J.
8	BASIS	1	DATE(I)	1-24	6A4	Date of most recent changes in data files.
9	SCAN GOT	1 per plot or subcomp.	IBK	1-2	I2	Block number. Must be at least one block in working circle.
			KOMP	3-6	I4	Compartment number. Enter only if applicable.
			ISUB	7-9	I3	Subcompartment number. Enter only if applicable.

Card type	Read by	No. of cards	Variable name	Columns	Format	Description of variable
			QTR1	10-12	A3	Location in ¼ ¼ of public land survey. Replace columns 10-26 with other location data, where appropriate.
			QTR2	13-15	A3	Location in ¼ section of public land survey. See description of QTR1.
			SECT	16-18	A3	Section in which inventory plot or largest part of compartment is located. See description of QTR1.
			TOWN	19-22	A4	Township location of the section. See description of QTR1.
			RANG	23-26	A4	Range location of the section. See description of QTR1.
			SITE	27-29	F3.0	Average site index of the plot or subcompartment.
			STRY	30	F1.0	Indicates whether type is based on overstory (blank) or on understory (1).
			NTYP	31-32	I2	Vegetative or use type of the plot or subcompartment. Number from list on page type 5 of output in Appendix 2.
			WORK	33	F1.0	Code number of treatment needed during planning period, as shown in definitions of variables in Appendix 1.
			FISC	34-37	F4.0	Year in which treatment coded in WORK field is to be accomplished. For use in listing work loads with other computer programs.
			DBH(1)	38-40	F3.1	Average d.b.h. of the overstory trees.
			HT(1)	41-43	F3.0	Average height of dominant and codominant overstory trees.
			DEN(1)	44-48	F5.0	Number of overstory trees per acre.

Card type	Read by	No. of cards	Variable name	Columns	Format	Description of variable
			AGE(1)	49-51	F3.0	Average age of overstory trees.
			DMR(1)	52-53	F2.1	Dwarf mistletoe rating of overstory trees.
			DBH(2)	54-56	F3.1	Average d.b.h. of the understory trees.
			HT(2)	57-59	F3.0	Average height of potential dominants and codominants in the understory.
			DEN(2)	60-64	F5.0	Number of understory trees per acre.
			AGE(2)	65-67	F3.0	Average age of understory trees.
			DMR(2)	68-69	F2.1	Dwarf mistletoe rating of the understory trees.
			ACRE	70-74	F5.1	Area of the subcompartment described. Leave blank if data refer to plot, not stand, measurements.
			WHEN	75-78	F4.0	Year of first growing season after inventory record was made. For use in updating with PROGRAM GROW.
10	SCAN GOT	1	(Punch 99 in first two columns to stop reading of type 9 records.)			
11*	MAPS	1	MAP	1-4	I4	Index to print (1) or to omit (0) compartment maps.
			SCALE	5-10	F6.4	Acres represented by one code number on a compartment map.
12*	MAPS	1 per comp.	KBK	1-4	I4	Number of block in which the compartment is located.
			KOMP	5-8	I4	Number of the compartment being processed.
			NROW	9-12	I4	Number of rows of map symbols in the compartment map.
13*	MAPS	NROW per comp.	KTYP(I,J)	1-72	36I2	Type numbers in compartment type map.

Card type	Read by	No. of cards	Variable name	Columns	Format	Description of variable
14*	MAPS	NROW per comp.	KSUB(I,J)	1-72	36I2	Subcompartment numbers in compartment map of the subcompartments.
15*	AREA1	1 per comp.	KBK	1-4	I4	Number of block in which the compartment is located.
			KOMP	5-8	I4	Number of the compartment being processed.
16*	AREA1	4 per comp.	ARETY(I)	1-80	10F8.1	Acres of type I in the compartment being processed
17*	AREA2	1	ARBK(I)	1-56	7F8.1	Acres in block I.
18*	AREA2	1 per block	SARETY(I,J)	1-64	8F8.1	Acres of nontimber type J in block I.

Basic Information Used

Tabulations and explanations that follow describe the relationships to be determined locally to adapt TEVAP2 to other species or conditions. The first relationships appear as FORTRAN statements in subroutines CUTS and GOT; the remainder are part of the species-specific subroutines. Descriptions of the relationships include explanations of the program variables and related FORTRAN statements involved. Tabulations include only enough entries to explain the nature of the information needed; they do not indicate sample sizes or desirable ranges of data. Methods used to determine the relationships are found in standard mensuration texts and elsewhere (Myers 1971).

1. **Stand density after partial cutting.** — Some relationships are based on the basal area to be left after cutting for various average stand diameters. These relationships control amount of the reserve stand left after intermediate or partial regeneration cutting, once THIN(I) and DLEV(I) have been specified by the program user. Data needed take the following form:

Average stand d.b.h. after cutting (inches)	Basal area per acre	Average stand d.b.h. after cutting (inches)	Basal area per acre
	Sq. Ft.		Sq. Ft.
2.0	12.1	6.4	60.3
2.4	16.7	6.8	63.8
2.8	21.3	7.2	67.0
3.2	26.0	7.6	69.9
3.6	30.6	8.0	72.5
4.0	35.2	8.4	74.8
4.4	39.9	8.8	76.7
4.8	44.5	9.2	78.2
5.2	48.8	9.6	79.3
5.6	52.8	10.0+	80.0
6.0	56.6		

Values in this tabulation represent a few points on one of a family of curves (Myers 1971). Reserve basal area increases with average stand d.b.h. until 10.0 inches is reached. Thereafter, reserve basal area remains constant for

any one growing stock level. In the tabulation, constant basal area is 80.0 square feet per acre, and the values represent growing stock level 80. Other levels are named similarly. Thus, if THIN(I) or DLEV(I) is 100, basal area at any d.b.h. below 10.0 inches is the basal area for level 80 multiplied by 100/80. If d.b.h. is greater than 10.0 inches, retained basal area is DLEV(I).

Several statements in subroutine CUTS are derived from basal area values for level 80. Basal areas computed by them are multiplied by terms including THIN(I) or DLEV(I), redefined as REST, to provide for a range of possible growing stock levels. Variables defined by the statements and their use, are:

a. DBHP—to find a d.b.h. less than 10.0 inches when basal area is known. Three equations for DBHP are used to simplify representation of the nonlinear relationship between d.b.h. and basal area.

b. BREAK and BUST—to compute values of basal area that are the upper limits of applicability of the first two equations for DBHP.

c. SQFT—to find basal area when d.b.h. is known. Two equations represent the nonlinear relationship for d.b.h. less than 10.0 inches.

Two equations used to compute LEVL in subroutine GOT include the equations for SQFT. They give the equivalent growing stock level when average d.b.h. and basal area are known.

2. Total cubic feet per acre.—Stand volumes in total cubic feet are computed with stand volume equations. As listed in appendix 1, cubic volume is determined from: (1) basal area per acre, (2) average height of dominant and codominant trees, (3) average stand d.b.h., and (4) number of trees per acre.

Plot tallies of tree diameters and heights are converted to volumes per acre in total cubic feet and to basal areas and other values used as independent variables. Stand volume equations are then obtained by regression analysis. Total cubic volume per acre from ground line to tip of all trees more than 4.5 feet tall is the only volume computed directly by TEVAP2. Volumes in other units are obtained by use of conversion factors.

Values of six variables in each species-specific subroutine are obtained from the same regression coefficients: (1) TOT(IK) in section 1, (2) FVL(I) in section 3 and FVL(1) in section 8, (3) VLUS in section 4, (4) TVL(IK) in section 7, (5) TOTO in section 9, and (6) TOTT in section 10. Two statements are used for each variable because the relationship is not linear over the ranges of $D^2 H$ that may appear in computations of inventory data.

3. Conversion of total cubic feet to other units.—Volumes are first computed in total cubic feet per acre, as described above. They are then converted to other units with factors computed by section 2 of each species-specific subroutine. The second column, below, shows some of the ratios used to obtain equations for FCTR(I) in subroutine BHPP. The third column shows ratios used to compute PROD(I) for BHPP.

Average stand d.b.h. (Inches)	**Merchantable cubic feet ÷ total cubic feet**	**Board feet ÷ total cubic feet**
5.1	0.355	- -
6.0	.552	- -
6.9	.725	- -
8.3	.860	0.99
9.1	.901	1.55
10.3	.931	2.38
19.0	.962	5.33
23.4	.969	5.88

Utilization standards are given in COMMENT statements of section 2 of each species-specific subroutine. Other conversions could be added, such as those based on tree contents in square feet of veneer or in pounds of wood (Myers 1960).

Volume or weight per acre of numerous plots are determined in units of interest and in total cubic feet. Selection of appropriate units includes choice of minimum merchantable top diameter. The quantity of each unit per total cubic foot is determined separately for each plot. Regression analysis is used to obtain coefficients for computing the factors when average stand diameter and basal area are known. Minimum average diameters are specified for each factor in TEVAP2. Variability is so great with small diameters that the results serve no useful purpose.

Each call to section 2 of a species-specific subroutine is preceded by specification of the number of values of each factor needed and by the average diameter to be used. It is thus possible to keep separate such paired requirements as present and future stand and overstory and understory.

4. Future average stand d.b.h. with wide range of stand density.—Regression analysis is performed on stand data obtained on temporary and/or permanent plots that cover a wide range of stand densities, site indexes, etc. Average stand d.b.h. in 10 years is expressed as a function of several readily measured stand

variables. For the species named in appendix 1, the following were significant independent variables: present average d.b.h., average height of dominants and codominants, basal area, and site index.

The relationship appears in two places in each species-specific subroutine: (1) FDM(I) in section 3, and (2) DMUS in section 4. Elsewhere, future average d.b.h. is estimated with an equation developed from data from stands at or near densities that could be objectives of management.

5. **Noncatastrophic mortality.**—Normal mortality may be important in unthinned stands, but minor and erratic in thinned stands. Such was the case with the species represented by subroutines in appendix 1. No pattern of mortality could be found in stands with an average d.b.h. of 10.0 inches or larger.

Data for the mortality equation come from two sources:

a. Permanent plots that have been measured at least as frequently as the prediction period to be used.

b. Temporary plots that have not been partially cut for a number of years equal to the prediction period. Trees dead at time of treatment must have been felled or marked at that time.

For species used as examples, percentage reduction in number of trees was expressed as a function of average d.b.h. and basal area, both at the beginning of the period.

Future stand density is computed as FDN(I) in section 3, as FDN(1) in section 8, as DENO in section 12, and as DNUS in section 4 of each species-specific subroutine. Definitions and values of the variables change during record processing. The first computation, the equation that varies by species, produces percentage mortality in 10 years, expressed as a decimal. The 10-year period equals the projection period of related equations that estimate future diameter and height. Later FDN(I), DNUS, or DENO is redefined as future number of trees and is computed from the original value of FDN(I), DNUS, or DENO.

6. **Tree heights with wide range of stand density.**—Future average heights of dominant and codominant trees, without restrictions on stand density, are computed as FHT(I) in section 3, as FHT(1) in section 8, and as HTUS by section 4 of each species-specific subroutine. Heights in 10 years are estimated from present average height, stand age, site index, and basal area. Data needed for regression analysis may be obtained from remeasurements of permanent plots or from borings and ring counts on temporary plots.

7. **Increase in average d.b.h. from cutting.**—Effect of partial regeneration cutting or thinning from below on average stand d.b.h. is simulated by subroutine CUTS. Thinning from below includes the removal of occasional larger trees, as occurs in actual practice. Statements for DBHE and PDBHE, which may vary by species, appear in section 5 of each species-specific subroutine. DBHE represents the estimated d.b.h. after thinning and is computed directly if at least 50 percent of the trees are to be retained. The relationship is highly nonlinear if fewer trees are retained, so PDBHE is then computed and its antilogarithm becomes DBHE.

Change in average diameter can be estimated from data obtained during repeated trial marking of plots that cover a range of tree sizes and densities. By multiple regression analysis, equations are obtained that estimate diameter after cutting from diameter before cutting and the percentage of trees retained.

A computer program that simulates partial cutting, computes the values needed for regression analysis, and punches the data cards is described elsewhere (Myers 1971).

8. **Cubic feet from saw-log cut.**—An equation for ADD in section 6 of each species-specific subroutine estimates the merchantable cubic feet obtainable as a byproduct of saw-log cuts. To obtain the basic data, plots representing a wide range of stand conditions are measured. Cubic- and board-foot volumes of all trees above minimum size for saw logs are summed to obtain equivalent volumes per acre for each plot. The dependent variable for regression analysis is merchantable cubic feet per thousand board feet. Independent variables are average d.b.h. and thousands of board feet per acre. Whenever a cut is computed by subroutine GOT, the statement for ADD is used to compute the cubic volume contained in saw logs. ADD is then redefined to equal the difference between the total cubic volume of the cut and the cubic volume of saw logs. The new value for ADD is treated as a commercial yield if it is equal to or larger than the minimum commercial volume entered as COMCU(I).

9. **Tree heights with density near management goals.**—Average height of dominant and codominant trees, where height growth is not reduced by high stand density, is computed from data of the form:

Main stand age (Years)	Site index class			
	40	50	60	70
20	8	10	13	16
40	17	22	28	34
60 . . .	26	33	41	49
150	50	62	73	85

The relationships are expressed by statements for HTSO in the ninth section of each species-specific subroutine. If data from site index curves are used, the crown classes described must be the same as those used to develop the site curves. The crown classes must be the same as those used in the equations for total cubic feet, described in item 2, above.

10. Increase in average height from thinning. — Increases in average height of dominant and codominant trees due to partial cutting are estimated the same way as increases in average d.b.h. Results of repeated trial markings on plots covering a range of average diameters and densities provide the data needed for regression analysis. The increase, in feet, is correlated with the percentage of trees retained.

The relationship appears as the statement for ADDHT in section 10 of each species-specific subroutine, and as part of the statements for HT(KI) in section 7 and for HT(1) in section 8. At each cutting, the amount of the increase is added to height before thinning to obtain height after thinning. In section 10, it is also added to a cumulative sum of changes, HTCUM, so computed heights before thinning will show the effects of past treatment as well as of age and site quality.

As with change in diameter, it is possible to simulate thinnings on a computer to increase the number of combinations of variables available for regression (Myers 1971).

11. Future average stand d.b.h. with density near management goals. — Diameter in 10 years is estimated from present average d.b.h., site index, and present basal area. Future diameters are computed as FDM(1) in section 8 and as DBHO in section 11 of each species-specific subroutine. Data needed to obtain the prediction equations by regression analysis are gathered on temporary and/or permanent plots with stands within the desired range of densities (Myers 1971). This prediction equation is used in TEVAP2 wherever diameter growth in recently thinned stands is to be computed.

12. Effects of dwarf mistletoe. — Subroutine LDGP and SWPP give examples of how the effects of a damaging agent may be included in growth computations. In these cases, growth reduction is caused by dwarf mistletoe, Arceuthobium americanum Nutt. ex Engelm. or A. vaginatum subsp. cryptopodum (Engelm.) Hawks. and Wiens. Three statements in each subroutine contain species-specific relationships involving the amount of dwarf mistletoe present and its effect on growth. They are: (1) the last half of the statement for TEM, (2) the statements for DIE, and (3) the statement for PCT. Each of the three statements appears in sections 3, 4, and 8 of subroutines LDGP and SWPP. In each case, the measure of dwarf mistletoe present is the dwarf mistletoe rating, DMR (Hawksworth 1961).

The last half of the statement for TEM gives the percentages of the 10-year increase in average d.b.h. of healthy stands that will occur with varying amounts of dwarf mistletoe. The statements for DIE give the percentage of live trees at start of the period that will die during the period. This percentage will be used instead of the percentage from FDN(I), if larger. FDN(I) is based on noncatastrophic mortality in healthy stands and will be less than DIE unless the dwarf mistletoe rating is so low that FDN(I) and DIE are equal. PCT is the percentage of the periodic height growth of healthy stands that will occur in stands with various degrees of infestation. Additional information on these relationships is available elsewhere (Myers et al. 1971, Myers et al. 1972, Hawksworth and Myers 1973).

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APPENDIX 1

Listing of Program TEVAP2

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      PROGRAM TEVAP2
     1(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE4=TAPE5,TAPE3=TAPE5)

 DEFINITIONS OF VARIABLES.

      ABFAG(I,J) = ACTUAL GROWING STOCK IN M BD. FT. FOR WORKING GROUP I
           AND AGE CLASS J.
      ACBAR(I) = DEFORESTED ACRES IN BLOCK I.
      ACFNL(I,J,K) = ACRES TO RECEIVE FINAL CUT DURING NEXT PERIOD -
           WORKING GROUP I, BLOCK J, AGE CLASS K.
      ACINT(I) = ACRES RECEIVING INTERMEDIATE CUT ANNUALLY IN BALANCED
           FOREST, WORKING GROUP I.
      ACRE = AREA OF THE STAND DESCRIBED BY THE INVENTORY RECORD, IF
           KNOWN. BLANK INDICATES RECORD APPLIES TO SAMPLE PLOT.
      ACRGN(I,J,K) = ACRES TO RECEIVE REGENERATION CUT DURING NEXT
           PERIOD - WORKING GROUP I, BLOCK J, AGE CLASS K.
      ACSI(I,J,K) = ACRES OF WORKING GROUP I, BLOCK J, SITE CLASS K.
      ACSP(I,J) = ACRES OF WORKING GROUP I IN BLOCK J.
      ADD = CUBIC FEET PRODUCED AS BYPRODUCT OF SAWLOG CUTS.
      ADDHT = INCREASE IN AVERAGE HEIGHT FROM THINNING FROM BELOW.
      ADJ(I) = YEARS IN ADJUSTMENT PERIOD, WORKING GROUP I.
      AGE(I) = AVERAGE AGE OF OVERSTORY(I=1) OR UNDERSTORY(I=2).
      AGED = STAND AGE AT EACH STEP OF YIELD TABLE.
      AGETH(I,J) = AGE AT INITIAL THINNING, WORKING GROUP I,
           SITE CLASS J.
      ALLCF(I,J) = GROWING STOCK GOAL FOR WORKING GROUP I, SITE CLASS J.
           CUBIC FEET OF ENTIRE STANDS TO ROTATION AGE.
      ALOWC(I) = ALLOWABLE ANNUAL CUT IN HUNDREDS OF CU. FT., BASED ON
           ACTUAL AND DESIRED GROWING STOCKS OF WORKING GROUP I.
      ALWBF(I) = ALLOWABLE ANNUAL CUT IN M BD. FT., BASED ON ACTUAL AND
           DESIRED GROWING STOCKS OF WORKING GROUP I.
      AMCAG(I,J) = ACTUAL GROWING STOCK IN HUNDREDS OF CU. FT. FOR
           WORKING GROUP I AND AGE CLASS J.
      ANBDF(I) = M BD. FT. PER ACRE AT END OF EACH YEAR.
      ANCUT(I,J) = AREA / ROTATION FOR WORKING GROUP I, SITE CLASS J.
      ANCUV(I) = CU. FT. STANDING PER ACRE AT END OF EACH YEAR.
      ANNAC = TOTAL ACRES TO BE TREATED ANNUALLY DURING NEXT PERIOD.
      ANNBD = EXPECTED TOTAL ANNUAL YIELD DURING NEXT PERIOD IN
           M BD. FT.
      ANNCU = EXPECTED TOTAL ANNUAL YIELD DURING NEXT PERIOD IN CU. FT.
      ARBK(I) = AREA OF BLOCK I.
      AREA(I,J) = AREA OF SITE CLASS J OCCUPIED BY WORKING GROUP I.
           INCLUDES SHARE OF DEFORESTED AREA.
      ARECP = TOTAL AREA OF COMPARTMENT.
      ARESC(I) = ACRES IN SUBCOMPARTMENT I.
      ARETY(I) = ACRES OF TYPE I IN ONE COMPARTMENT.
      BARE = DEFORESTED ACRES IN A COMPARTMENT.
      BARSI(I,J) = DEFORESTED ACRES OF SITE J IN BLOCK I.
      BAS(I) = BASAL AREA OF OVERSTORY(I=1) OR UNDERSTORY(I=2).
      BASD = BASAL AREA PER ACRE BEFORE THINNING.
      BAST = BASAL AREA PER ACRE AFTER THINNING.
      BAUS = BASAL AREA OF UNDERSTORY.
      BDAI = M.A.I. IN M BD. FT. FROM YIELD TABLE.
      BDFC(I) = M BD. FT. REMOVED PER ACRE.
      BDFD(I) = M BD. FT. PER ACRE BEFORE THINNING.
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C     BDFT = M BD. FT. PER ACRE AFTER THINNING.
C     BDMAI(I) = M.A.I. IN M BD. FT. FROM YIELD TABLE AND ACRES IN SITE
C          CLASS, WORKING GROUP I.
C     BDUS = M BD. FT. IN UNDERSTORY.
C     BFAGE(I,J) = GROWING STOCK GOAL IN M BD. FT. FOR WORKING GROUP I
C          AND AGE CLASS J.
C     BFBLK(I) = M BD. FT. IN BLOCK I.
C     BFINT(I) = M BD. FT. FROM INTERMEDIATE CUTS ANNUALLY IN BALANCED
C          FOREST, WORKING GROUP I.
C     BFM(I) = M BD. FT. IN OVERSTORY(I=1) OR IN UNDERSTORY(I=2).
C     BFMRCH = MINIMUM VOLUME TO BE INCLUDED IN BD. FT. GROWING STOCK.
C     BFS(I) = GROWING STOCK GOAL BY AGE CLASS I FOR ONE SITE CLASS OF
C          WORKING CIRCLE, M BD. FT.
C     BFSP(I,J) = M BD. FT. OF WORKING GROUP I IN BLOCK J.
C     BFTB(I,J) = M BD. FT. IN TYPE J OF BLOCK I.
C     BFTH(I,J) = CURRENT POTENTIAL PERIODIC YIELD FROM THINNINGS IN
C          BLOCK I AND TYPE J, M BD. FT.
C     BFVOL = M BD. FT. PER ACRE MINUS VOLUME LEFT AS SEED SOURCE.
C     CFAGE(I,J) = GROWING STOCK GOAL IN MERCHANTABLE CUBIC FEET FOR
C          WORKING GROUP I AND AGE CLASS J.
C     CFAI = M.A.I. IN HUNDREDS OF CU. FT. FROM YIELD TABLE.
C     CFBF(I,J) = GROWING STOCK GOAL FOR WORKING GROUP I, SITE CLASS J.
C          CUBIC FEET IN SAWLOG TREES.
C     CFMC(I) = MERCHANTABLE CU. FT. REMOVED PER ACRE.
C     CFMER(I) = MERCH. CU. FT. IN BLOCK I, IN HUNDREDS.
C     CFMD(I) = MERCHANTABLE CU. FT. PER ACRE BEFORE THINNING.
C     CFMT = MERCHANTABLE CU. FT. PER ACRE AFTER THINNING.
C     CFTB(I,J) = TOTAL CU. FT. IN TYPE J OF BLOCK I, IN HUNDREDS.
C     CFVOL = CU. FT. PER ACRE MINUS VOLUME LEFT AS SEED SOURCE.
C     CM(I) = HUNDREDS OF MERCH. CU. FT. IN OVERSTORY(I=1) OR IN
C          UNDERSTORY(I=2).
C     CMS(I) = GROWING STOCK GOAL BY AGE CLASS I FOR ONE SITE CLASS OF
C          WORKING CIRCLE, HUNDREDS OF CU. FT.
C     CMSP(I,J) = MERCH. CU. FT. OF WORKING GROUP I IN BLOCK J.
C     CMTB(I,J) = HUNDREDS OF MERCH. CU. FT. IN TYPE J OF BLOCK I.
C     CMTH(I,J) = CURRENT POTENTIAL PERIODIC YIELD FROM THINNINGS IN
C          BLOCK I AND TYPE J, HUNDREDS OF CUBIC FEET.
C     COMBF(I) = MINIMUM COMMERCIAL CUT OF WORKING GROUP I IN M BD. FT.
C     COMCU(I) = MINIMUM COMMERCIAL CUT OF WORKING GROUP I IN HUNDREDS
C          OF CUBIC FEET PER ACRE.
C     CUCY(I) = INTERVAL BETWEEN INTERMEDIATE CUTS FOR WORKING GROUP I.
C     CUINT(I) = CU. FT. FROM INTERMEDIATE CUTS ANNUALLY IN BALANCED
C          FOREST, WORKING GROUP I.
C     CUMAI(I) = M.A.I. IN HUNDREDS OF CU. FT. FROM YIELD TABLE AND
C          ACRES IN SITE CLASS, WORKING GROUP I.
C     CUTA(I,J) = POTENTIAL BD. FT. VOLUME, LESS SHELTERWOOD, AVAILABLE
C          FROM REGENERATION CUTS - BLOCK I, TIMBER TYPE J.
C     CUTB(I,J) = POTENTIAL BD. FT. VOLUME AVAILABLE FROM REMOVAL OF
C          OVERWOOD - BLOCK I, TIMBER TYPE J.
C     CVR(I) = NUMBER OF MAP SQUARES IN TYPE I.
C     CYCL = INTERVAL BETWEEN INTERMEDIATE CUTS.
C     DATE = DATE OF MOST RECENT CHANGES IN INVENTORY OR OTHER DATA.
C     DBH(I) = AVERAGE D.B.H. OF OVERSTORY(I=1) OR UNDERSTORY(I=2).
C     DBHE = ESTIMATE OF AVERAGE D.B.H. AFTER THINNING.
C     DBHD = AVERAGE STAND D.B.H. BEFORE THINNING.
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C     DBHT = AVERAGE STAND D.B.H. AFTER THINNING.
C     DBHTH(I,J) = AVERAGE STAND D.B.H. AT AGE AGETH(I,J), WORKING
C          GROUP I, SITE CLASS J.
C     DELAY(I) = YEARS DELAY BETWEEN CLEARCUTTING AND ESTABLISHMENT OF
C          NEW STAND, WORKING GROUP I.
C     DEN(I) = TREES PER ACRE IN OVERSTORY(I=1) OR UNDERSTORY(I=2).
C     DENO = TREES PER ACRE BEFORE THINNING.
C     DENT = TREES PER ACRE AFTER THINNING.
C     DENTH(I,J) = NUMBER OF TREES PER ACRE JUST BEFORE INITIAL
C          THINNING, WORKING GROUP I, SITE CLASS J.
C     DFBF(I,J) = DIFFERENCE BETWEEN ACTUAL STOCK AND GOAL IN M BD. FT.
C          FOR WORKING GROUP I AND AGE CLASS J.
C     DFMC(I,J) = DIFFERENCE BETWEEN ACTUAL STOCK AND GOAL IN HUNDREDS
C          OF CU. FT. FOR WORKING GROUP I AND AGE CLASS J.
C     DLEV(I) = GROWING STOCK LEVEL FOR THINNINGS AFTER INITIAL CUT,
C          WORKING GROUP I.
C     DMR(I) = DWARF MISTLETOE RATING OF PLOT OR SUBCOMPARTMENT, BY
C          OVERSTORY(I=1) AND UNDERSTORY(I=2).
C     DMUS = AVERAGE D.B.H. OF UNDERSTORY.
C     DNUS = NUMBER OF TREES IN UNDERSTORY.
C     EQIV(I) = ACRES PER STANDARD ACRE, SITE CLASS I, FROM BOARD FEET.
C     EQVCF(I) = ACRES PER STANDARD ACRE, SITE CLASS I, FROM CUBIC FEET.
C     FAC(I) = RATIO OF YIELD OF SITE CLASS I TO STANDARD YIELD, BOTH
C          IN BOARD FEET.
C     FACCF(I) = RATIO OF YIELD OF SITE CLASS I TO STANDARD YIELD, BOTH
C          IN CUBIC FEET.
C     FBA(I) = FUTURE BASAL AREA OF OVERSTORY(I=1) OR UNDERSTORY(I=2).
C     FBD(I) = FUTURE M BD. FT. IN OVERSTORY(I=1) OR UNDERSTORY(I=2).
C     FCTR(I) = MERCHANTABLE CU. FT. PER TOTAL CU. FT. - FACTOR.
C     FDM(I) = FUTURE AVERAGE D.B.H. OF OVERSTORY(1) OR UNDERSTORY(2).
C     FDN(I) = FUTURE TREES PER ACRE IN OVERSTORY(1) OR UNDERSTORY(2).
C     FHT(I) = FUTURE AVE. HEIGHT OF OVERSTORY(I=1) OR UNDERSTORY(I=2).
C     FINB(I) = EXPECTED ANNUAL YIELD IN M BD. FT. FROM FINAL CUTS
C          DURING NEXT PERIOD, WORKING GROUP I.
C     FINC(I) = EXPECTED ANNUAL YIELD IN CU. FT. FROM FINAL CUTS DURING
C          NEXT PERIOD, WORKING GROUP I.
C     FMC(I) = FUTURE MERCH. CU. FT. IN OVERSTORY(1) OR UNDERSTORY(2).
C     FNAC(I) = EXPECTED ACRES TO RECEIVE FINAL CUTS ANNUALLY DURING
C          NEXT PERIOD, WORKING GROUP I.
C     FNBD(I) = ANNUAL YIELD FROM FINAL CUTS WITH BALANCED SERIES OF AGE
C          CLASSES, M BD. FT. OF WORKING GROUP I.
C     FNCU(I) = ANNUAL YIELD FROM FINAL CUTS WITH BALANCED SERIES OF AGE
C          CLASSES, CU. FT. OF WORKING GROUP I.
C     FORET(I) = NAME OF FOREST OR WORKING CIRCLE.
C     FVL(I) = FUTURE TOTAL VOLUME OF OVERSTORY(I=1) OR UNDERSTORY(I=2).
C     GRBD(I,J,K) = PERIODIC GROWTH OF WORKING GROUP I, BLOCK J, AND AGE
C          CLASS K IN M BD. FT.
C     GRMC(I,J,K) = PERIODIC GROWTH OF WORKING GROUP I, BLOCK J, AND AGE
C          CLASS K IN HUNDREDS OF MERCH. CU. FT.
C     GROWB(I,J,K) = GROWTH RATE OF BD. FT. IN SHELTERWOOD.  WORKING
C          GROUP I, REMOVAL CUT J, SITE INDEX CLASS K.
C     GROWC(I,J,K) = GROWTH RATE OF CU. FT. IN SHELTERWOOD.  WORKING
C          GROUP I, REMOVAL CUT J, SITE INDEX CLASS K.
C     GRUP(I) = AREA OF WORKING GROUP I IN A COMPARTMENT.
C     GVLBF(I) = TOTAL GROWING STOCK GOAL FOR WORKING GROUP I, M BD. FT.
C     GVLCU(I) = TOTAL GROWING STOCK GOAL FOR WORKING GROUP I, CU. FT.
C          SUM OF APPROPRIATE SUBCF(I,J) FOR SUB-SAWLOG TREES.
C     HELP(I,J) = POTENTIAL NONCOMMERCIAL THINNING IN NEXT PERIOD, ACRES
C          OF TYPE J IN BLOCK I.
C     HT(I) = AVERAGE HEIGHT OF OVERSTORY(I=1) OR UNDERSTORY(I=2).
C     HTCUM = CUMULATIVE CHANGE IN AVERAGE HEIGHT FROM THINNING.
C     HTSO = TREE HEIGHT BEFORE THINNING.
C     HTST = TREE HEIGHT AFTER THINNING.
C     HTUS = AVERAGE HEIGHT OF UNDERSTORY TREES.
C     IBK = BLOCK SOURCE OF INVENTORY RECORD.
C     ICT9 = NUMBER OF LOGICAL UNIT FOR CARD TYPE 9 INPUT.
C          ICT9 = 4, READ INVENTORY FROM TAPE FILE.
C          ICT9 = 5, READ INVENTORY FROM CARD FILE.
C     INVL(I,J,K) = INTERVAL BETWEEN CUTS AFTER AGE REGN(I,J,K). WORKING
C          GROUP I, REMOVAL CUT J, SITE CLASS K. J=1 OR 2.
C     ISUB = SUBCOMPARTMENT SOURCE OF INVENTORY RECORD.
C     KAK = SUBSCRIPT FOR WORKING GROUP IN VARIOUS ARRAYS.
C     KAN = SUBSCRIPT FOR SITE CLASS IN VARIOUS ARRAYS.
C     KBK = BLOCK NUMBER.
C     KOMP = COMPARTMENT NUMBER.
C     KSUB(I,J) = SUBCOMPARTMENT NUMBERS OF MAP SQUARES.
C     KTYP(I,J) = TYPE CLASSIFICATION OF MAP SQUARES.
C     MAP = INDEX TO PRINT (1) OR OMIT (0) MAPS.
C     MIN = MINIMUM AGE FOR STAND TO BE INCLUDED IN GROWING STOCK.
C     MNK = TEMPORARY VARIABLE, ASSIGNED MEANINGS AS NEEDED.
C     NBK = NUMBER OF BLOCKS IN WORKING CIRCLE. MUST BE AT LEAST ONE.
C     NCMP = NUMBER OF COMPARTMENTS IN WORKING CIRCLE.
C     NROW = NUMBER OF ROWS IN COMPARTMENT MAP.
C     NSBK(I) = NUMBER OF SUBCOMPARTMENTS IN BLOCK I.
C     NSI(I) = NUMBER OF SITE CLASSES IN WORKING GROUP I.
C     NSUB = NUMBER OF SUBCOMPARTMENTS IN WORKING CIRCLE.
C     NTYP = COVER OR USE TYPE OF INVENTORY PLOT OR SUBCOMPARTMENT.
C     NWGP = NUMBER OF WORKING GROUPS IN WORKING CIRCLE.
C     OPBD(I) = ALLOWABLE ANNUAL CUT IN M BD. FT. FOR WORKING GROUP I
C          WITH BALANCED AGE CLASSES, REGENERATION CUTS.
C     OPCU(I) = ALLOWABLE ANNUAL CUT IN CU. FT. FOR WORKING GROUP I WITH
C          BALANCED AGE CLASSES, REGENERATION CUTS.
C     OPEN(I,J) = POTENTIAL COMMERCIAL THINNING IN NEXT PERIOD, ACRES OF
C          TYPE J IN BLOCK I.
C     OPTION = OPTION DESIRED TO MAKE AREA CALCULATIONS. MAY BE AREA1,
C          AREA2, OR MAPS.
C     OURS = ACRES IN WORKING CIRCLE, EXCLUDING OTHER OWNERSHIP.
C     PABR(I) = DEFORESTED ACRES IN BLOCK I, EXCLUDING UNITS WITH KNOWN
C          AREA ON INVENTORY RECORD.
C     PAFN(I,J,K) = ACRES TO RECEIVE FINAL CUT - WORKING GROUP I, BLOCK
C          J, AGE CLASS K - EXCLUDES AREAS ON INVENTORY RECORD.
C     PAIBD(I) = P.A.I. IN M BD. FT., WORKING GROUP I.
C     PAICU(I) = P.A.I. IN HUNDREDS OF CUBIC FEET, WORKING GROUP I.
C     PARG(I,J,K) = ACRES TO RECEIVE REGENERATION CUT - WORKING GROUP I,
C          BLOCK J, AGE CLASS K - EXCLUDES KNOWN AREAS.
C     PARTY(I,J) = AREA OF TYPE J IN BLOCK I, EXCLUDING UNITS WITH KNOWN
C          AREA ON INVENTORY RECORD.
C     PASI(I,J,K) = ACRES OF WORKING GROUP I, BLOCK J, AND SITE CLASS K,
C          EXCLUDING KNOWN AREAS.
C     PASP(I,J) = AREA OF WORKING GROUP I IN BLOCK J, EXCLUDING UNITS
C          WITH KNOWN AREA ON INVENTORY RECORD.
C     PBFT(I,J) = POTENTIAL YIELD IN M BD. FT. FROM THINNINGS - BLOCK I,
C          TYPE J - EXCLUDING UNITS OF KNOWN AREA.
C     PBRSI(I,J) = DEFORESTED ACRES OF SITE J IN BLOCK I, EXCLUDING
C          UNITS WITH KNOWN AREA ON INVENTORY RECORD.
C     PCMT(I,J) = POTENTIAL YIELD IN MERCH. CU. FT. FROM THINNINGS -
C          BLOCK I, TYPE J - EXCLUDING UNITS OF KNOWN AREA.
C     PCTA(I,J) = POTENTIAL BD. FT. CUT FROM REGENERATION CUTS- BLOCK I,
C          TYPE J - EXCLUDING UNITS OF KNOWN AREA.
C     PCTB(I,J) = POTENTIAL BD. FT. CUT FROM FINAL CUTS - BLOCK I, TYPE
C          J - EXCLUDING UNITS OF KNOWN AREA.
C     PDCFN(I,J) = EXPECTED YIELD IN CU. FT. FROM FINAL CUTS DURING NEXT
C          PERIOD, BLOCK I, TYPE J.
C     PDCFR(I,J) = EXPECTED YIELD IN CU. FT. FROM REGENERATION CUTS NEXT
C          PERIOD, BLOCK I, TYPE J.
C     PDCUT(I) = ACRES IN AGE CLASS WITH BALANCED SERIES OF AGE CLASSES.
C     PGBD(I,J,K) = PERIODIC GROWTH IN M BD. FT. WORKING GROUP I, BLOCK
C          J, AGE CLASS K, EXCLUDING UNITS OF KNOWN AREA.
C     PGMC(I,J,K) = PERIODIC GROWTH IN MERCH. CU. FT. WORKING GROUP I,
C          BLOCK J, AGE CLASS K, EXCLUDING UNITS OF KNOWN AREA.
C     PHLP(I,J) = POTENTIAL NONCOMMERCIAL THINNING IN NEXT PERIOD, ACRES
C          OF TYPE J IN BLOCK I. RECORDS WITH AREA = 0.0, ONLY.
C     PDOR(I) = MINIMUM SITE INDEX FOR MANAGEMENT, WORKING GROUP I.
C     POPN(I,J) = POTENTIAL COMMERCIAL THINNING IN NEXT PERIOD, ACRES OF
C          TYPE J IN BLOCK I. RECORDS WITH AREA = 0.0, ONLY.
C     PPBF(I,J,K) = TOTAL VOLUME IN M BD. FT. FOR WORKING GROUP I, BLOCK
C          J, AGE CLASS K. EXCLUDES UNITS OF KNOWN AREA.
C     PPCR(I,J) = EXPECTED YIELD IN CU. FT. FROM REGENERATION CUTS -
C          BLOCK I, TYPE J - EXCLUDING UNITS OF KNOWN AREA.
C     PPFN(I,J) = EXPECTED YIELD IN CU. FT. FROM FINAL CUTS - BLOCK I,
C          TYPE J - EXCLUDING UNITS OF KNOWN AREA.
C     PPMC(I,J,K) = TOTAL VOLUME IN MERCH. CU. FT. FOR WORKING GROUP I,
C          BLOCK J, AND AGE CLASS K. EXCLUDES KNOWN AREAS.
C     PPTC(I,J,K) = SUM OF TOTAL CU. FT. FOR WORKING GROUP I, BLOCK J,
C          AGE CLASS K. EXCLUDES UNITS OF KNOWN AREA.
C     PRET = PERCENTAGE OF TREES RETAINED AFTER INITIAL THINNING.
C     PROD(I) = BOARD FEET PER TOTAL CUBIC FOOT - CONVERSION FACTOR.
C     PS(I,J,K) = NUMBER OF INVENTORY PLOTS OF WORKING GROUP I, BLOCK J,
C          AND SITE CLASS K.
C     PSLV(I,J) = BD. FT. VOLUME TO BE SALVAGED - BLOCK I, TYPE J -
C          EXCLUDING UNITS OF KNOWN AREA.
C     PSPLT(I,J) = NUMBER OF INVENTORY PLOTS OF BLOCK I AND TYPE J. NOT
C          INCLUDING UNITS OF KNOWN AREA.
C     PTBF(I,J,K) = TOTAL VOLUME IN M BD. FT. FOR WORKING GROUP I, BLOCK
C          J, AND AGE CLASS K.
C     PTCU(I,J,K) = SUM OF TOTAL CU. FT. FOR WORKING GROUP I, BLOCK J,
C          AND AGE CLASS K. IN HUNDREDS OF CU. FT.
C     PTMC(I,J,K) = TOTAL VOLUME IN MERCH. CU. FT. FOR WORKING GROUP I,
C          BLOCK J, AND AGE CLASS K. IN HUNDREDS OF CU. FT.
C     PUNC(I,J) = AREA OF BLOCK I, TYPE J BELOW MINIMUM SITE QUALITY
C          FOR REGULATION, EXCLUDING UNITS OF KNOWN AREA.
C     QUAL(I) = SITE CLASSES PRESENT IN WORKING GROUP I.
C     REGN(I,J,K) = AGE AT WHICH REGENERATION CUT MADE. WORKING GROUP I,
C          CUT J, SITE CLASS K. J=1,2, OR 3.
C     RGAC(I) = EXPECTED ACRES GIVEN REGENERATION CUTS ANNUALLY DURING
C          NEXT PERIOD, WORKING GROUP I.
C     RGBD(I) = EXPECTED ANNUAL YIELD IN M BD. FT. FROM REGENERATION
C          CUTS DURING NEXT PERIOD, WORKING GROUP I.
C     RGCU(I) = EXPECTED ANNUAL YIELD IN CU. FT. FROM REGENERATION CUTS
C          DURING NEXT PERIOD, WORKING GROUP I.
C     RINT(I) = NUMBER OF YEARS FOR WHICH EQUATIONS PREDICT GROWTH WITH
C          A SINGLE PROJECTION, WORKING GROUP I.
C     ROTA = OLDEST STAND AGE IN A YIELD TABLE.
C     SACCF = AREA OF WORKING CIRCLE IN STANDARD ACRES, FROM CU. FT.
C     SAHP(I) = POTENTIAL NONCOMMERCIAL THINNING IN NEXT PERIOD, ACRES
C          IN WORKING GROUP I.
C     SANCUT(I) = ALLOWABLE ANNUAL CUT IN ACRES, WORKING GROUP I.
C     SARETY(I,J) = AREA OF TYPE J IN BLOCK I.
C     SARSC = TOTAL AREA OF SUBCOMPARTMENTS OF A COMPARTMENT.
C     SARSP(I) = TOTAL AREA OF WORKING GROUP I, INCLUDING SHARE OF
C          DEFORESTED AREA.
C     SATH(I) = POTENTIAL COMMERCIAL THINNING IN NEXT PERIOD, ACRES IN
C          WORKING GROUP I.
C     SBARB = TOTAL BRUSHY DEFORESTED ACRES IN WORKING CIRCLE.
C     SBARE = TOTAL DEFORESTED ACRES IN WORKING CIRCLE.
C     SBARG = TOTAL GRASSY DEFORESTED ACRES IN WORKING CIRCLE.
C     SBDF = M BD. FT. IN WORKING CIRCLE.
C     SBF(I) = TOTAL M BD. FT. IN WORKING GROUP I.
C     SBFR(I) = BD. FT. FROM THINNINGS NEXT PERIOD, WORKING GROUP I.
C     SBH(I) = BD. FT. FROM REGENERATION CUTS DURING NEXT PERIOD,
C          WORKING GROUP I.
C     SBM(I,J) = BD. FT. FROM THINNING DURING NEXT PERIOD, WORKING GROUP
C          I, BLOCK J.
C     SBSV(I) = BD. FT. FROM SALVAGE NEXT PERIOD, WORKING GROUP I.
C     SCA(I,J) = BD. FT. FROM REGENERATION CUTS DURING NEXT PERIOD,
C          WORKING GROUP I, BLOCK J.
C     SCALE = ACRES IN ONE MAP SQUARE.
C     SCB(I,J) = BD. FT. FROM FINAL CUTS NEXT PERIOD, WORKING GROUP I,
C          BLOCK J.
C     SCFM = HUNDREDS OF MERCH. CU. FT. IN WORKING CIRCLE.
C     SCN(I) = EXPECTED YIELD IN CU. FT. FROM FINAL CUTS DURING NEXT
C          PERIOD, WORKING GROUP I.
C     SCNB(I,J) = EXPECTED YIELD IN CU. FT. FROM FINAL CUTS DURING NEXT
C          PERIOD, WORKING GROUP I, BLOCK J.
C     SCNT(I) = EXPECTED YIELD IN CU. FT. FROM FINAL CUTS DURING NEXT
C          PERIOD, TYPE I.
C     SCR(I) = EXPECTED YIELD IN CU. FT. FROM REGENERATION CUTS DURING
C          NEXT PERIOD, WORKING GROUP I.
C     SCRB(I,J) = EXPECTED YIELD IN CU. FT. FROM REGENERATION CUTS
C          DURING NEXT PERIOD, WORKING GROUP I, BLOCK J.
C     SCRT(I) = EXPECTED YIELD IN CU. FT. FROM REGENERATION CUTS DURING
C          NEXT PERIOD, TYPE I.
C     SCU(I,J) = CU. FT. FROM THINNING NEXT PERIOD, WORKING GROUP I,
C          BLOCK J.
C     SCUR(I) = CU. FT. FROM THINNING NEXT PERIOD, WORKING GROUP I.
C     SDBF(I) = TOTAL DIFFERENCE BETWEEN ACTUAL AND GOAL GROWING STOCKS
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C         IN M BD. FT. FOR WORKING GROUP I.
C     SDMC(I) = TOTAL DIFFERENCE BETWEEN ACTUAL AND GOAL GROWING STOCK
C         IN HUNDREDS OF CU. FT. FOR WORKING GROUP I.
C     SFNL(I) = ACRES FOR FINAL CUT ANNUALLY WITH OVERWOOD AND BALANCED
C         DISTRIBUTION OF AGE CLASSES, WORKING GROUP I.
C     SFR(I) = BD. FT. FROM FINAL CUTS, NEXT PERIOD, WORKING GROUP I.
C     SHELT(I,J,K) = M BD. FT. PER ACRE LEFT AS SHELTERWOOD.  WORKING
C         GROUP I, REMOVAL CUT J, SITE CLASS K.
C     SHL(I,J) = POTENTIAL NONCOMMERCIAL THINNING IN NEXT PERIOD,
C         WORKING GROUP I IN BLOCK J.
C     SHWD(I,J,K) = CU. FT. PER ACRE LEFT AS SHELTERWOOD.  WORKING
C        -GROUP I, REMOVAL CUT J, SITE CLASS K.
C     SIDLA = TOTAL ALLOWABLE CUT IN ACRES FOR ONE YEAR IN A BALANCED
C         WORKING CIRCLE.
C     SIDLB = TOTAL ALLOWABLE CUT IN M BD. FT. FOR ONE YEAR IN A
C         BALANCED WORKING CIRCLE.
C     SIDLC = TOTAL ALLOWABLE CUT IN CU. FT. FOR ONE YEAR IN A BALANCED
C         WORKING CIRCLE.
C     SITE = SITE INDEX.
C     SLAND = TOTAL ACRES IN WORKING CIRCLE.
C     SLVG(I,J) = BD. FT. VOLUME TO BE SALVAGED, BLOCK I, TYPE J.
C     SMC(I) = HUNDREDS OF CUBIC FEET OF WORKING GROUP I IN WORKING
C         CIRCLE.
C     SMPL = ACRES OF TYPE J OF BLOCK I REPRESENTED BY ONE INVENTORY
C         PLOT.
C     SMSP(I) = AREA OF WORKING GROUP I IN WORKING CIRCLE.
C     SOP(I,J) = POTENTIAL COMMERCIAL THINNING IN NEXT PERIOD, WORKING
C         GROUP I IN BLOCK J.
C     SOPTA(I) = TOTAL ALLOWABLE CUT IN ACRES FOR ONE YEAR IN BALANCED
C         WORKING GROUP I.
C     SOPTB(I) = TOTAL M BD. FT. CUT IN ONE YEAR WITH A BALANCED SERIES
C         OF AGE CLASSES, WORKING GROUP I.
C     SOPTC(I) = TOTAL CU. FT. CUT IN ONE YEAR WITH A BALANCED SERIES OF
C         AGE CLASSES, WORKING GROUP I.
C     SPLT(I,J) = NUMBER OF PLOT AND SUBCOMPARTMENT RECORDS, TIMBER TYPE
C         J OF BLOCK I.
C     SPNUM(I) = INDEX NUMBER TO IDENTIFY SET OF SPECIES-SPECIFIC
C         STATEMENTS TO BE CALLED BY SUBROUTINE WORKGP.
C     SSL(I,J) = BD. FT. FROM SALVAGE NEXT PERIOD, WORKING GROUP I,
C         BLOCK J.
C     SSPT = TOTAL OF INVENTORY PLOTS IN WORKING CIRCLE.
C     SSTAC = AREA OF WORKING CIRCLE IN STANDARD ACRES FROM BOARD FEET.
C     STACF(I) = AREA OF SITE CLASS I IN STANDARD ACRES - FROM CU. FEET.
C     STBS(I) = BD. FT. FROM THINNINGS DURING NEXT PERIOD, TYPE I.
C     STC(I) = TOTAL CU. FT. OF WORKING GROUP I IN WORKING CIRCLE.
C     STCF = TOTAL CU. FT. IN WORKING CIRCLE, IN HUNDREDS.
C     STDAC(I) = AREA OF SITE CLASS I IN STANDARD ACRES - FROM BD. FEET.
C     STFO(I) = BD. FT. FROM FINAL CUTS DURING NEXT PERIOD, TYPE I.
C     STHBF = CURRENT POTENTIAL PERIODIC YIELD FROM THINNINGS, TOTAL FOR
C         WORKING CIRCLE IN M BD. FT.
C     STHCM = CURRENT POTENTIAL PERIODIC YIELD FROM THINNINGS, TOTAL FOR
C         WORKING CIRCLE IN HUNDREDS OF CUBIC FEET.
C     STHP(I) = POTENTIAL NONCOMMERCIAL THINNING IN NEXT PERIOD, ACRES
C         OF TYPE I.
C     STHR(I) = BD. FT. FROM REGENERATION CUTS DURING NEXT PERIOD,
C         TYPE I.
C     STLV(I) = BD. FT. FROM SALVAGE DURING NEXT PERIOD, TYPE I.
C     STNC(I) = CU. FT. FROM THINNING DURING NEXT PERIOD, TYPE I.
C     STON(I) = POTENTIAL COMMERCIAL THINNING IN NEXT PERIOD, ACRES OF
C         TYPE I.
C     STRY = STAND COMPONENT USED TO TYPE THE STAND. ENTER 1 IF THE
C         UNDERSTORY WAS USED. OTHERWISE LEAVE BLANK.
C     STYP(I) = ACRES OF TYPE I IN WORKING CIRCLE.
C     SUBBF(I,J) = GROWING STOCK GOAL FOR WORKING GROUP I, SITE CLASS J.
C         M BD. FT. IN SAWLOG TREES.
C     SUBCF(I,J) = GROWING STOCK GOAL FOR WORKING GROUP I, SITE CLASS J.
C         CUBIC FEET IN TREES BELOW SAWLOG SIZE.
C     SUBTY(I) = TYPE OF SUBCOMPARTMENT I.
C     SUMCF(I) = TOTAL GROWING STOCK GOAL FOR WORKING GROUP I IN MERCH.
C         CU. FT. SUM OF APPROPRIATE ALLCF(I,J) FOR ENTIRE STANDS.
C     SUNC = TOTAL LOW SITE ACRES IN WORKING CIRCLE.
C     SYST(I) = FLAG SET IF WORKING GROUP I TO BE REGENERATED BY SEED
C         TREES OR SHELTERWOOD.
C     TBA(I) = BASAL AREA AFTER THINNING TO SPECIFIED LEVEL NOW (I=1) OR
C         IN TIME YEARS (I=2).
C     TBD(I) = M BD. FT. AFTER THINNING TO SPECIFIED LEVEL NOW (I=1) OR
C         IN TIME YEARS (I=2).
C     TCF(I) = TOTAL CUBIC FEET IN BLOCK I.
C     TCM(I) = HUNDREDS OF CU. FT. AFTER THINNING TO SPECIFIED LEVEL NOW
C         (I=1) OR IN TIME YEARS (I=2).
C     TCSP(I,J) = TOTAL CU. FT. OF WORKING GROUP I IN BLOCK J.
C     TDM(I) = AVERAGE D.B.H. AFTER THINNING TO SPECIFIED LEVEL NOW
C         (I=1) OR IN TIME YEARS (I=2).
C     TEM = TEMPORARY VARIABLE, ASSIGNED MEANINGS AS NEEDED.
C     THAC(I) = POSSIBLE ACRES TO THIN ANNUALLY DURING NEXT PERIOD,
C         WORKING GROUP I.
C     THB = AVERAGE POTENTIAL VOLUME FROM THINNING, M BD. FT.
C     THBD(I) = EXPECTED ANNUAL YIELD IN M BD. FT. FROM THINNINGS DURING
C         NEXT PERIOD, WORKING GROUP I.
C     THC = AVERAGE POTENTIAL VOLUME FROM THINNING, HUNDREDS OF CU. FT.
C     THCU(I) = EXPECTED ANNUAL YIELD IN CU. FT. FROM THINNINGS DURING
C         NEXT PERIOD, WORKING GROUP I.
C     THIN(I) = GROWING STOCK LEVEL, INITIAL THINNING, WORKING GROUP I.
C     TIME = NUMBER OF YEARS IN PLANNING PERIOD. BASIS FOR WORK INDEX.
C     TMBR = TOTAL TIMBERED AREA IN WORKING CIRCLE.
C     TMPD = TOTAL AREA OF FOREST TYPES IN WORKING CIRCLE, INCLUDING
C         NONSTOCKED TYPES.
C     TOT(I) = TOTAL CUBIC FEET IN OVERSTORY(I=1) OR UNDERSTORY(I=2).
C     TOTAC(I) = TOTAL ACRES EXPECTED TO BE TREATED IN ONE YEAR DURING
C         NEXT PERIOD, WORKING GROUP I.
C     TOTBD(I) = EXPECTED TOTAL ANNUAL YIELD IN M BD. FT. DURING NEXT
C         PERIOD, WORKING GROUP I.
C     TOTC = TOTAL CUBIC FEET REMOVED PER ACRE.
C     TOTCU(I) = EXPECTED TOTAL ANNUAL YIELD IN CU. FT. DURING NEXT
C         PERIOD, WORKING GROUP I.
C     TOTO = TOTAL CUBIC FEET PER ACRE BEFORE THINNING.
C     TOTT = TOTAL CUBIC FEET PER ACRE AFTER THINNING.
C     TPB(I,J) = NUMBER OF INVENTORY PLOTS, WORKING GROUP I, BLOCK J.
C     TVL(I) = TOTAL CU. FT. AFTER THINNING TO SPECIFIED LEVEL NOW (I=1)
C         OR IN TIME YEARS (I=2).
C     TYPNM(I,J) = DESCRIPTION OF VEGETATIVE TYPE OR USE TYPE NUMBER I.
C     UNCML(I,J) = AREA OF BLOCK I AND TIMBER TYPE J BELOW MINIMUM
C         SITE QUALITY FOR TIMBER MANAGEMENT AND REGULATION.
C     UNIT(I) = NUMBER OF MAP SQUARES IN SUBCOMPARTMENT I.
C     VLBF(I) = VOLUME IN M BD. FT. CUT FROM SITE I.
C     VLCU(I) = VOLUME IN CU. FT. CUT FROM SITE I.
C     VLLV(I,J,K) = PERCENTAGE OF PREVIOUS DLEV(I) LEFT AT AGE
C         REGN(I,J,K). WORKING GROUP I, CUT J, SITE CLASS K. J=1 OR 2.
C         ENTERED AS A DECIMAL.
C     WGNUM(I) = NUMBER ASSIGNED TO WORKING GROUP I.
C     WGPDES(I,J) = DESCRIPTION OF SILVICULTURAL PRESCRIPTION FOR
C         WORKING GROUP I.
C     WGPNM(I,J) = NAME OF WORKING GROUP I.
C     WHEN = YEAR OF FIRST GROWING SEASON AFTER INVENTORY WAS MADE.
C     WORK = CODE FOR TREATMENT IN NEXT PERIOD, AS -
C         0 = DO NOTHING THIS PERIOD
C         1 = PLANT OR SEED
C         2 = THIN
C         3 = SALVAGE
C         4 = REGENERATION CUT
C         5 = REMOVE SEED TREES OR SHELTERWOOD
C         6 = REMOVE OVERWOOD AND THIN RESIDUAL
C
      COMMON ADD,AGE(2),AGEO,BA(2),BAS(2),BASO,BAST,BAUS,BFMRCH,BFVOL,
     1CFVOL,DATE(6),DBH(2),DBHE,DBHO,DBHT,DEN(2),DENO,DENT,DMUS,FBA(2),
     2FCTR(2),FDM(2),FDN(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSO,
     3HTST,KAK,KNO,MIN,MNK,NBK,NCMP,NSUB,NWGP,PDBHE,PRET,PROD(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLAND,TBA(2),TDM(2),TEM,TIME,TMBR
     5,TMPO,TOT(2),TOTD,TOTT,TVL(2),VOM(2),VLUS,DMR(2)
      COMMON ABFAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BDMAI(5),BFAGE(5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),DBHTH(5,14),DELAY(5),DENTH(5,14),DLEV(5),FNBD(5),
     4FNCU(5),GROWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),OPBD(5),OPCU(5),PAIBD(5),PAICU(5),POOR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBF(5),SHELT(5,2,14),SHWD(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     8WGNUM(5),WGPDES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),OPEN(7,27),PBRSI(7,14),PDCFN(7,27
     2),POCFR(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLT(
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBD(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      COMMON /OPT/ OPTION,ICT9
C
      COMMON /BLKA/ ANBOF(151),ANCUV(151),BDFC(150),BDFO(150),CFMC(150),
     1CFMO(150),CYCL,IROT,KAN,PD1,PD2,QUAL(14),ROTA,VLBF(14),VLCU(14)
C
      COMMON /BLKB/ PAFN(5,7,15),PARG(5,7,15),
     1PBFT(7,27),PCMT(7,27),PCTA(7,27),PCTB(7,27),PGBD(5,7,15),PGMC(5,7,
     215),PHLP(7,27),POPN(7,27),PPBF(5,7,15),PPCR(7,27),PPFN(7,27),
     3PPMC(5,7,15),PPTC(5,7,15),PSLV(7,27),PTBF(5,7,15),PTCU(5,7,15),
     4PTMC(5,7,15)
C
      COMMON /BLKC/ ANNAC,ANNBD,ANNCU,FINB(5),FINC(5),FNAC(5),RGAC(5),
     1RGBD(5),RGCU(5),SAHP(5),SANCUT(5),SATH(5),SBFR(5),SBH(5),SBSV(5),
     2SCA(5,7),SCB(5,7),SCN(5),SCNB(5,7),SCNT(25),SCR(5),SCRB(5,7),
     3SCRT(25),SCU(5,7),SCUR(5),SFNL(5),SFR(5),SHL(5,7),SIDLA,SIDLB,
     4SIDLC,SOP(5,7),SOPTA(5),SOPTB(5),SOPTC(5),SSL(5,7),STBS(25),STFO
     5(25),STHP(25),STHR(25),STLV(25),STNC(25),STON(25),THAC(5),THBD(5),
     6THCU(5),TOTAC(5),TOTBD(5),TOTCU(5),SBM(5,7)
C
      COMMON /BLKD/ IJ,IK,KI,VOL,TVOL
C
      COMMON /BLKE/ RABOF(5),RABOI(5),RABOR(5),RABT(5),RACFN(5),RACIT(5)
     1,RACRG(5),RATC(5),SRABD,SRACF
C
C READ VARIABLES THAT APPLY TO THE WORKING CIRCLE.
C
      CALL BASIS
C
C INITIALIZE VARIABLES APPLICABLE TO THE WORKING CIRCLE.
C
      CALL INIT
C
C MAKE INITIAL READING OF INVENTORY RECORDS.
C
      CALL SCAN
C
C CALL APPROPRIATE ROUTINE TO COMPUTE AREAS.
C
      IF (OPTION .EQ. 4HAPS ) CALL MAPS
      IF (OPTION .EQ. 4HREA1) CALL AREA1
      IF (OPTION .EQ. 4HREA2) CALL AREA2
C
C COMPUTE AREAS OF VARIOUS SUBDIVISIONS OF WORKING CIRCLE.
C
      CALL LAND
C
C COMPUTE GROWING STOCK GOALS AND AREA CONTROL.
C
      CALL GOAL
C
C COMPUTE PRESENT VOLUMES, FUTURE GROWTH, ETC., FROM INVENTORY DATA.
C
      CALL GOT
      CALL SUMS
C
C DETERMINE DIFFERENCES BETWEEN PRESENT FOREST AND GOALS. PRINT A
C GUIDE TO MANAGEMENT.
C
      CALL SUMRY
      CALL GIDE1
      CALL GIDE2
      CALL EXIT
      END
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Subroutine BASIS

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      SUBROUTINE BASIS
C
C TO READ VARIABLES THAT APPLY TO THE WORKING CIRCLE.
C
      COMMON ADD,AGE(2),AGEO,BA(2),BAS(2),BASO,BAST,BAUS,BFMRCH,BFVOL,
     1CFVOL,DATE(6),DBH(2),DBHE,DBHO,DBHT,DEN(2),DENO,DENT,DMUS,FBA(2),
     2FCTR(2),FDM(2),FDN(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSO,
     3HTST,KAK,KNO,MIN,MNK,NBK,NCMP,NSUB,NWGP,PDBHE,PRET,PROD(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLAND,TBA(2),TOM(2),TEM,TIME,TMBR
     5,TMPO,TOT(2),TOTO,TOTT,TVL(2),VDM(2),VLUS,DMR(2)
      COMMON ABFAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BDMAI(5),BFAGE(5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),DBHTH(5,14),DELAY(5),DENTH(5,14),DLEV(5),FNBO(5),
     4FNCU(5),GROWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),OPBD(5),OPCU(5),PAIBO(5),PAICU(5),POOR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBF(5),SHELT(5,2,14),SHWD(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     8WGNUM(5),WGPDES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),OPEN(7,27),PBRSI(7,14),POCFN(7,27
     2),POCFR(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLT(
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBD(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      COMMON /OPT/ OPTION,ICT9
C
      DO 1 I=1,5
      DO 1 J=1,3
      DO 1 K=1,14
      INVL(I,J,K) = 0
      REGN(I,J,K) = 0.0
      VLLV(I,J,K) = 0.0
    1 CONTINUE
      DO 5 I=1,5
      DO 5 J=1,14
      AGETH(I,J) = 0.0
      DBHTH(I,J) = 0.0
    5 DENTH(I,J) = 0.0
C
C INITIALIZE AREA OPTION FIELD TO BLANK.
C
      OPTION = 5H
C
C READ CARD TYPE 1.
C
      READ (5,10) OPTION,ICT9,(FORET(I),I=1,19)
   10 FORMAT (1X,A4,I1,18A4,A2)
      IF(ICT9 .EQ. 0) ICT9 = 5
C
C READ CARD TYPE 2.
C
      READ (5,15) ((TYPNM(I,J),J=1,5),I=1,35)
   15 FORMAT (8(5A2))
C
C READ CARD TYPE 3.
C
      READ (5,20) NBK,NCMP,NWGP,MIN,BFMRCH,TIME
   20 FORMAT (4I4,2F4.2)
C
C DO LOOP TO READ A CARD GROUP FOR EACH WORKING GROUP.
C
      DO 45 I=1,NWGP
C
C INITIALIZE VARIABLES TO BE READ IN.
C
      ADJ(I) = 0.0
      COMBF(I) = 0.0
      COMCU(I) = 0.0
      CUCY(I) = 0.0
      DELAY(I) = 0.0
      DLEV(I) = 0.0
      POOR(I) = 0.0
      RINT(I) = 0.0
      SPNUM(I) = 0.0
      THIN(I) = 0.0
C
C READ CARD TYPE 4.
C
      READ (5,25) (WGPNM(I,J),J=1,3),WGNUM(I),THIN(I),DLEV(I),POOR(I),CO
     1MBF(I),COMCU(I),ADJ(I),DELAY(I),RINT(I),CUCY(I),SPNUM(I)
   25 FORMAT (3A4,F5.0,4F4.1,F5.2,4F4.1,F4.0)
C
C READ CARD TYPE 5.
C
      READ (5,30) (WGPDES(I,K),K=1,20)
   30 FORMAT (20A4)
C
C READ CONTROLS FOR REGENERATION CUTS.  INCLUDE UP TO 14 CARDS FOR EACH
C WORKING GROUP TO COVER ALL 10-FOOT SITE INDEX CLASSES FROM POOR(I)
C TO AT LEAST HIGHEST CLASS POSSIBLE.  END WITH A BLANK TYPE 6 CARD IF
C CLASSES DO NOT GO TO 140.
C
      MPR = POOR(I) * 0.1 + 0.45
      DO 40 J=MPR,14
C
C READ CARD TYPE 6.
C
      READ (5,35) REGN(I,1,J),VLLV(I,1,J),INVL(I,1,J),REGN(I,2,J),VLLV(I
     1,2,J),INVL(I,2,J),REGN(I,3,J)
   35 FORMAT (F4.0,F6.3,I3,F4.0,F6.3,I3,F4.0)
      IF(REGN(I,1,J) .EQ. 0.0) GO TO 45
C
C READ CARD TYPE 7.
C
      READ (5,38) AGETH(I,J),DENTH(I,J),DBHTH(I,J)
   38 FORMAT (3F5.1)
   40 CONTINUE
   45 CONTINUE
C
C READ CARD TYPE 8.
C
      READ (5,50) (DATE(I),I=1,6)
   50 FORMAT (6A4)
C
C PRINT PAGE TYPE 4 - RECORD OF VALUES READ BY THIS ROUTINE.
C
      WRITE (6,60)
   60 FORMAT (1H1,///,61X,11HPAGE TYPE 4)
      WRITE (6,65)
   65 FORMAT (1H0,39X,53HRECORD OF MANAGEMENT DECISIONS AND CURRENT COND
     1ITIONS)
      WRITE (6,70) (FORET(I),I=1,19)
   70 FORMAT (1H ,29X,18A4,A2,//)
      WRITE (6,75) NBK,NCMP
   75 FORMAT (1H ,10X,18HNUMBER OF BLOCKS -,I3,32X,24HNUMBER OF COMPARTM
     1ENTS -,I4)
      WRITE (6,80) MIN,NWGP
   80 FORMAT (1H0,10X,31HMINIMUM AGE FOR GROWING STOCK -,I3,19X,26HNUMBE
     1R OF WORKING GROUPS -,I4)
      WRITE (6,85) BFMRCH,TIME
   85 FORMAT (1H0,10X,37HMINIMUM M BD. FT. FOR GROWING STOCK -,F5.1,11X,
     134HLENGTH OF PLANNING PERIOD, YEARS -,F4.0,/)
      WRITE (6,90)
   90 FORMAT (1H0,55X,72H*- - - - - - - - - - - - W O R K I N G    G R O U P
     1 - - - - - - - - - - - - - -*)
      WRITE (6,95) ((WGPNM(I,J),J=1,3),I=1,NWGP)
   95 FORMAT (1H ,55X,5(3A4,3X))
      WRITE (6,100) (POOR(I),I=1,NWGP)
  100 FORMAT (1H0,10X,31HLOWEST SITE CLASS TO BE MANAGED,14X,F7.1,4(8X,F
     17.1))
      WRITE (6,105) (CUCY(I),I=1,NWGP)
  105 FORMAT (1H0,10X,30HLENGTH OF CUTTING CYCLE, YEARS,15X,F7.1,4(8X,F7
     1.1))
      WRITE (6,110) (ADJ(I),I=1,NWGP)
  110 FORMAT (1H0,10X,34HLENGTH OF ADJUSTMENT PERIOD, YEARS,11X,F7.1,4(8
     1X,F7.1))
      WRITE (6,115) (DELAY(I),I=1,NWGP)
  115 FORMAT (1H0,10X,37HEXPECTED DELAY IN REGENERATION, YEARS,8X,F7.1,4
     1(8X,F7.1))
      WRITE (6,120) (THIN(I),I=1,NWGP)
  120 FORMAT (1H0,10X,35HSTOCKING LEVEL FOR INITIAL THINNING,10X,F7.1,4(
     18X,F7.1))
      WRITE(6,125) (DLEV(I),I=1,NWGP)
  125 FORMAT (1H0,10X,36HSTOCKING LEVEL, SUBSEQUENT THINNINGS,9X,F7.1,4(
     18X,F7.1))
      WRITE (6,130) (COMBF(I),I=1,NWGP)
  130 FORMAT (1H0,10X,33HMINIMUM COMMERCIAL CUT, M BD. FT.,12X,F7.1,4(8X
     1,F7.1))
      WRITE (6,135) (COMCU(I),I=1,NWGP)
  135 FORMAT (1H0,10X,31HMINIMUM COMMERCIAL CUT, CU. FT.,14X,F7.1,4(8X,F
     17.1))
      WRITE (6,140) (RINT(I),I=1,NWGP)
  140 FORMAT (1H0,10X,34HLENGTH OF PREDICTION PERIOD, YEARS,11X,F7.1,4(8
     1X,F7.1))
      WRITE (6,150)
  150 FORMAT (1H0,//,11X,23HCUBIC FEET IN HUNDREDS.)
      RETURN
      END
```

Subroutine INIT

```
      SUBROUTINE INIT
C
C TO INITIALIZE VARIABLES THAT APPLY TO WORKING CIRCLE.
C
      COMMON ADD,AGE(2),AGEO,BA(2),BAS(2),BASO,BAST,BAUS,BFMRCH,BFVOL,
     1CFVOL,DATE(6),DBH(2),DBHE,DBHO,DBHT,DEN(2),DENO,DENT,DMUS,FBA(2),
     2FCTR(2),FDM(2),FDN(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSO,
     3HTST,KAK,KNO,MIN,MNK,NBK,NCMP,NSUB,NWGP,PDBHE,PRET,PROD(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLAND,TBA(2),TOM(2),TEM,TIME,TMBR
     5,TMPO,TOT(2),TOTO,TOTT,TVL(2),VDM(2),VLUS,DMR(2)
      COMMON ABFAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BDMAI(5),BFAGE(5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),DBHTH(5,14),DELAY(5),DENTH(5,14),DLEV(5),FNBD(5),
     4FNCU(5),GROWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),OPBD(5),OPCU(5),PAIBD(5),PAICU(5),POOR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBF(5),SHELT(5,2,14),SHWD(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     8WGNUM(5),WGPDES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),OPEN(7,27),PBRSI(7,14),POCFN(7,27
     2),POCFR(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLT(
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBD(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      COMMON /BLKD/ IJ,IK,KI,VOL,TVOL
C
      IJ = 0
      IK = 0
      KI = 0
      MNK = 0
      NSUB = 0
      SBARB = 0.0
      SBARE = 0.0
      SBARG = 0.0
      SLAND = 0.0
      TEM = 0.0
      TMBR = 0.0
      TMPO = 0.0
      TVOL = 0.0
      VOL = 0.0
```

```
      DO 5 I=1,NBK
      ACBAR(I) = 0.0
      ARBK(I) = 0.0
      NSBK(I) = 0
      PABR(I) = 0.0
      TMTY(I) = 0.0
      DO 5 J=1,35
      PARTY(I,J) = 0.0
    5 SARETY(I,J) = 0.0
      DO 10 I=1,35
   10 STYP(I) = 0.0
      DO 15 I=1,NWGP
      ACINT(I) = 0.0
      ALOWC(I) = 0.0
      ALWBF(I) = 0.0
      BOMAI(I) = 0.0
      BFINT(I) = 0.0
      CUINT(I) = 0.0
      CUMAI(I) = 0.0
      FNBO(I) = 0.0
      FNCU(I) = 0.0
      OPBO(I) = 0.0
      OPCU(I) = 0.0
      PAIBO(I) = 0.0
      PAICU(I) = 0.0
      SYST(I) = 0.0
      DO 15 J=1,NBK
      ACSP(I,J) = 0.0
      PASP(I,J) = 0.0
      TPB(I,J) = 0.0
      DO 15 K=1,14
      ACSI(I,J,K) = 0.0
      PASI(I,J,K) = 0.0
      PS(I,J,K) = 0.0
   15 CONTINUE
      DO 20 I=1,NWGP
      DO 20 J=1,NBK
      DO 20 K=1,15
      ACFNL(I,J,K) = 0.0
      ACRGN(I,J,K) = 0.0
      GRBO(I,J,K) = 0.0
   20 GRMC(I,J,K) = 0.0
      DO 25 I=1,NBK
      DO 25 J=1,14
      BARSI(I,J) = 0.0
      PBRSI(I,J) = 0.0
   25 CONTINUE
      DO 30 I=1,NWGP
      GVLBF(I) = 0.0
      GVLCU(I) = 0.0
      NSI(I) = 0
      SARSP(I) = 0.0
      SBF(I) = 0.0
      SMC(I) = 0.0
      SMSP(I) = 0.0
      SUMCF(I) = 0.0
      DO 30 J=1,14
      ALLCF(I,J) = 0.0
      ANCUT(I,J) = 0.0
      AREA(I,J) = 0.0
      CFBF(I,J) = 0.0
      SUBBF(I,J) = 0.0
      SUBCF(I,J) = 0.0
   30 CONTINUE
      DO 35 I=1,NWGP
      DO 35 J=1,15
      ABFAG(I,J) = 0.0
      AMCAG(I,J) = 0.0
      BFAGE(I,J) = 0.0
   35 CFAGE(I,J) = 0.0
      DO 40 I=1,NBK
      DO 40 J=1,27
      BFTH(I,J) = 0.0
      CMTH(I,J) = 0.0
      CUTA(I,J) = 0.0
      CUTB(I,J) = 0.0
      HELP(I,J) = 0.0
      OPEN(I,J) = 0.0
      PDCFN(I,J) = 0.0
      PDCFR(I,J) = 0.0
      PSPLT(I,J) = 0.0
      PUNC(I,J) = 0.0
      SLVG(I,J) = 0.0
      SPLT(I,J) = 0.0
      UNCML(I,J) = 0.0
   40 CONTINUE
      DO 45 I=1,2
      BA(I) = 0.0
      FCTR(I) = 0.0
      PROD(I) = 0.0
      VDM(I) = 0.0
   45 CONTINUE
      DO 50 I=1,NBK
      DO 50 J=1,2
      DO 50 K=1,14
      GROWB(I,J,K) = 0.0
      GROWC(I,J,K) = 0.0
      SHELT(I,J,K) = 0.0
      SHWD(I,J,K) = 0.0
   50 CONTINUE
      RETURN
      END
```

Subroutine SCAN

```
      SUBROUTINE SCAN
C
C TO MAKE PRELIMINARY EXAMINATION OF INVENTORY RECORDS.
C
       COMMON ADD,AGE(2),AGEO,BA(2),BAS(2),BASO,BAST,BAUS,BFMRCH,BFVOL,
     1CFVOL,DATE(6),DBH(2),DBHE,DBHD,DBHT,DEN(2),DENO,DENT,DMUS,FBA(2),
     2FCTR(2),FDM(2),FDN(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSD,
     3HTST,KAK,KND,MIN,MNK,NBK,NCMP,NSUB,NWGP,PDBHE,PRET,PROD(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLAND,TBA(2),TDM(2),TEM,TIME,TMBR
     5,TMPO,TOT(2),TOTO,TOTT,TVL(2),VDM(2),VLUS,DMR(2)
       COMMON ABFAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BOMAI(5),BFAGE(5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),DBHTH(5,14),DELAY(5),DENTH(5,14),DLEV(5),FNBO(5),
     4FNCU(5),GROWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),OPBD(5),OPCU(5),PAIBD(5),PAICU(5),PDDR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBF(5),SHELT(5,2,14),SHWD(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     8WGNUM(5),WGPDES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
       COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7.27),NSBK(7),OPEN(7,27),PBRSI(7,14),PDCFN(7,27
     2),PDCFR(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLT(
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
       COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBO(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
       COMMON /OPT/ OPTION,ICT9
C
C READ INVENTORY RECORDS FROM CARD TYPE 9 TO COUNT THEM BY BLOCK, TYPE,
C ETC. LAST RECORD IS CARD TYPE 10 WITH IBK = 99 TO STOP PROCESSING.
C
   10 READ (ICT9,15) IBK,KOMP,ISUB,OTR1,OTR2,SECT,TOWN,RANG,SITE,STRY,
     1NTYP,WORK,FISC,DBH(1),HT(1),DEN(1),AGE(1),DMR(1),DBH(2),HT(2),DEN(
     22),AGE(2),DMR(2),ACRE,WHEN
   15 FORMAT (I2,I4,I3,3A3,2A4,F3.0,F1.0,I2,F1.0,F4.0,F3.1,F3.0,F5.0,F3.
     10,F2.1,F3.1,F3.0,F5.0,F3.0,F2.1,F5.1,F4.0)
      IF(IBK .EQ. 99) GO TO 50
      SPLT(IBK,NTYP) = SPLT(IBK,NTYP) + 1.0
      IF(ACRE .GT. 0.0) GO TO 20
      PSPLT(IBK,NTYP) = PSPLT(IBK,NTYP) + 1.0
      GO TO 22
   20 SARETY(IBK,NTYP) = SARETY(IBK,NTYP) + ACRE
      PARTY(IBK,NTYP) = PARTY(IBK,NTYP) + ACRE
      TMTY(IBK) = TMTY(IBK) + ACRE
   22 ISI = (SITE + 4.5) * 0.1
      IF(ISI .LT. 1) GO TO 10
      IF(NTYP .LE. 25) GO TO 30
      IF(ACRE .EQ. 0.0) GO TO 25
      BARSI(IBK,ISI) = BARSI(IBK,ISI) + ACRE
      GO TO 10
   25 PBRSI(IBK,ISI) = PBRSI(IBK,ISI) + 1.0
      GO TO 10
   30 IF(NTYP .GT. 0 .AND. NTYP .LT. 6) KAK = 1
      IF(NTYP .GT. 5 .AND. NTYP .LT. 11) KAK = 2
      IF(NTYP .GT. 10 .AND. NTYP .LT. 16) KAK = 3
      IF(NTYP .GT. 15 .AND. NTYP .LT. 21) KAK = 4
      IF(NTYP .GT. 20 .AND. NTYP .LT. 26) KAK = 5
      IF(ACRE .EQ. 0.0) GO TO 35
      ACSI(KAK,IBK,ISI) = ACSI(KAK,IBK,ISI) + ACRE
      PASP(KAK,IBK) = PASP(KAK,IBK) + ACRE
      GO TO 40
   35 PS(KAK,IBK,ISI) = PS(KAK,IBK,ISI) + 1.0
   40 IF(SITE .GE. PDDR(KAK)) GO TO 10
      IF(ACRE .EQ. 0.0) GO TO 45
      UNCML(IBK,NTYP) = UNCML(IBK,NTYP) + ACRE
      GO TO 10
   45 PUNC(IBK,NTYP) = PUNC(IBK,NTYP) + 1.0
      GO TO 10
   50 IF(ICT9 .NE. 5) REWIND ICT9
C
C COUNT NUMBER OF SITE CLASSES FOR EACH WORKING GROUP.
C
      DO 95 I=1,NWGP
      CD = PDDR(I) * 0.1
      DO 90 K=1,14
      M = 15 - K
      AB = M + 1
      IF(AB .LE. CD) GO TO 95
      DO 85 J=1,NBK
      IF(ACSI(I,J,M) .GT. 0.0) GO TO 80
      IF(PS(I,J,M) .GT. 0.0) GO TO 80
      GO TO 85
   80 NSI(I) = AB - CD
      GO TO 95
   85 CONTINUE
   90 CONTINUE
   95 CONTINUE
      DO 130 I=1,NWGP
      DO 120 K=1,14
      IF(REGN(I,2,K) .GT. 0.0) GO TO 125
  120 CONTINUE
      GO TO 130
  125 SYST(I) = 1.0
  130 CONTINUE
      RETURN
      END
```

Subroutine MAPS

```
      SUBROUTINE MAPS
C
C TO COMPUTE AREAS FROM TYPE AND SUBCOMPARTMENT MAPS.
C
       COMMON ADD,AGE(2),AGEO,BA(2),BAS(2),BASO,BAST,BAUS,BFMRCH,BFVOL,
     1CFVOL,DATE(6),DBH(2),DBHE,DBHD,DBHT,DEN(2),DENO,DENT,DMUS,FBA(2),
     2FCTR(2),FDM(2),FDN(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSD,
     3HTST,KAK,KND,MIN,MNK,NBK,NCMP,NSUB,NWGP,PDBHE,PRET,PROD(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLAND,TBA(2),TDM(2),TEM,TIME,TMBR
     5,TMPO,TOT(2),TOTO,TOTT,TVL(2),VDM(2),VLUS,DMR(2)
       COMMON ABFAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BOMAI(5),BFAGE(5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
```

```
     3),CUMAI(5),DBHTH(5,14),DELAY(5),DENTH(5,14),DLEV(5),FNBD(5),
     4FNCU(5),GROWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),OPBD(5),OPCU(5),PAIBD(5),PAICU(5),POOR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBF(5),SHELT(5,2,14),SHWD(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     8WGNUM(5),WGPOES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),OPEN(7,27),PBRSI(7,14),POCFN(7,27
     2),POCFR(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLT(
     37,27),TMTY(7),UNCML(7,27),PARR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRRO(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      DIMENSION KSUB(36,36),KTYP(36,36),ARESC(30),ARETY(35),CVR(35),SUBT
     1Y(30),UNIT(30),GRUP(5)
C
      DO 5 I=1,NBK
      DO 5 J=1,35
    5 SARETY(I,J) = 0.0
C
C READ CARD TYPE 11.
C
      READ (5,10) MAP,SCALE
   10 FORMAT (I4,F6.4)
C
C REPEAT LOOP FOR EACH COMPARTMENT.
C
      DO 500 KOL=1,NCMP
C
C INITIALIZE VARIABLES APPLICABLE TO A COMPARTMENT.
C
      DO 15 I=1,30
      ARESC(I) = 0.0
      SUBTY(I) = 0.0
   15 UNIT(I) = 0.0
      DO 20 I=1,NWGP
   20 GRUP(I) = 0.0
      DO 25 I=1,36
      DO 25 J=1,36
      KSUB(I,J) = 0
   25 KTYP(I,J) = 0
      DO 30 I=1,35
      ARETY(I) = 0.0
      CVR(I) = 0.0
   30 CONTINUE
      ARECP = 0.0
      BARE = 0.0
      SARSC = 0.0
C
C READ COMPARTMENT DATA FROM CARD TYPES 12, 13, AND 14.
C LOGICAL UNIT 3 HOLDS THE TAPE WITH MAPS IF TAPE IS USED.
C
      READ (3,35) KBK,KOMP,NROW
   35 FORMAT (3I4)
      READ (3,40) ((KTYP(I,J),J=1,36),I=1,NROW)
   40 FORMAT (36I2)
      READ (3,40) ((KSUB(I,J),J=1,36),I=1,NROW)
C
C COMPUTE TYPE AREAS AND TOTAL AREA.
C
      DO 50 I=1,NROW
      DO 45 J=1,36
      IF(KTYP(I,J) .LE. 0) GO TO 45
      MNK = KTYP(I,J)
      CVR(MNK) = CVR(MNK) + 1.0
   45 CONTINUE
   50 CONTINUE
      DO 55 I=1,35
      ARETY(I) = CVR(I) * SCALE
      SARETY(KBK,I) = SARETY(KBK,I) + ARETY(I)
      ARECP = ARECP + ARETY(I)
   55 CONTINUE
C
C COMPUTE AREA OF EACH WORKING GROUP AND DEFORESTED AREA.
C
      M = 1
      N = 5
      DO 65 I=1,NWGP
      DO 60 J=M,N
      GRUP(I) = GRUP(I) + ARETY(J)
   60 CONTINUE
      M = M + 5
      N = N + 5
   65 CONTINUE
      BARE = ARETY(26) + ARETY(27)
      ACBAR(KBK) = ACBAR(KBK) + BARE
      DO 70 I=1,NWGP
      ACSP(I,KBK) = ACSP(I,KBK) + GRUP(I)
   70 CONTINUE
      ARBK(KBK) = ARBK(KBK) + ARECP
C
C COMPUTE SUBCOMPARTMENT AREAS AND TYPES.
C
      DO 75 I=1,NWGP
      IF(GRUP(I) .GT. 0.0) GO TO 80
   75 CONTINUE
      IF(BARE .GT. 0.0) GO TO 80
      MNK = 0
      GO TO 150
   80 DO 90 I=1,NROW
      DO 85 J=1,36
      IF(KSUB(I,J) .LE. 0) GO TO 85
      NOS = KSUB(I,J)
      UNIT(NOS) = UNIT(NOS) + 1.0
      IF(SUBTY(NOS) .NE. 0.0) GO TO 85
      SUBTY(NOS) = KTYP(I,J)
   85 CONTINUE
   90 CONTINUE
      DO 95 I=1,30
      ARESC(I) = UNIT(I) * SCALE
      SARSC = SARSC + ARESC(I)
   95 CONTINUE
C
C COUNT NUMBER OF SUBCOMPARTMENTS IN A BLOCK.
C COMPUTE INDEX FOR PRINTING SUBCOMPARTMENT AREAS.
C
      DO 100 I=1,30
      MNK = I
      IF(ARESC(I) .EQ. 0.0) GO TO 105
  100 CONTINUE
  105 NSBK(KBK) = NSBK(KBK) + MNK - 1
      IF(ARESC(30) .GT. 0.0) NSBK(KBK) = NSBK(KBK) + 1.0
      TEM = MNK
      MNK = TEM * 0.5
C
C PRINT TYPE AND SUBCOMPARTMENT MAPS, IF DESIRED.
C
  150 IF(MAP .EQ. 0) GO TO 450
C
C CONVERT MAP CODES TO DISPLAY CODE AND RIGHT JUSTIFY. OCTAL CODE WILL
C VARY WITH MODEL OF COMPUTER.
C
      DO 175 I=1,36
      DO 175 J=1,36
      IF(KTYP(I,J) .LT. 1) GO TO 160
      IF(KTYP(I,J) .LE. 9) GO TO 165
      N = 0
  155 N = N + 1
      KTYP(I,J) = KTYP(I,J) - 10
      IF(KTYP(I,J) .GT. 9) GO TO 155
      GO TO 170
  160 KTYP(I,J) = 5555B
      GO TO 175
  165 KTYP(I,J) = KTYP(I,J) + 2907
      GO TO 175
  170 KTYP(I,J) = KTYP(I,J) + 27
      KTYP(I,J) = KTYP(I,J) + (N * 64 + 1728)
  175 CONTINUE
      DO 200 I=1,36
      DO 200 J=1,36
      IF(KSUB(I,J) .LT. 1) GO TO 185
      IF(KSUB(I,J) .LE. 9) GO TO 190
      N = 0
  180 N = N + 1
      KSUB(I,J) = KSUB(I,J) - 10
      IF(KSUB(I,J) .GT. 9) GO TO 180
      GO TO 195
  185 KSUB(I,J) = 5555B
      GO TO 200
  190 KSUB(I,J) = KSUB(I,J) + 2907
      GO TO 200
  195 KSUB(I,J) = KSUB(I,J) + 27
      KSUB(I,J) = KSUB(I,J) + (N * 64 + 1728)
  200 CONTINUE
C
C PRINT PAGE TYPE 5 - TYPE AND SUBCOMPARTMENT MAPS AND AREAS.
C
C PRINT TYPE MAP AND TYPE AREAS.
C
      WRITE (6,250)
  250 FORMAT (1H1,/,62X,11HPAGE TYPE 5)
      WRITE (6,255) (FORET(I),I=1,19)
  255 FORMAT (1H ,30X,18A4,A2)
      WRITE (6,260) KOMP,KBK
  260 FORMAT (1H ,49X,27HTYPE MAP OF COMPARTMENT NO.,I4,25X,9HBLOCK NO.,
     1I2,/)
      DO 270 I=1,NROW
      WRITE (6,265) (KTYP(I,J),J=1,36)
  265 FORMAT (1H ,28X,36R2)
  270 CONTINUE
      WRITE (6,275)
  275 FORMAT (1H0,17X,10HCOVER TYPE,13X,5HACRES,4X,1H*,6X,10HCOVER TYPE,
     113X,5HACRES,4X,1H*,6X,10HCOVER TYPE,13X,5HACRES,/)
      DO 285 I=1,10
      J = I + 15
      N = I + 25
      WRITE (6,280) I,(TYPNM(I,K),K=1,5),ARETY(I),J,(TYPNM(J,K),K=1,5),
     1ARETY(J),N,(TYPNM(N,K),K=1,5),ARETY(N)
  280 FORMAT (1H ,15X,I2,2X,5A2,4X,F12.1,4X,1H*,4X,I2,2X,5A2,4X,F12.1,
     14X,1H*,4X,I2,2X,5A2,4X,F12.1)
  285 CONTINUE
      DO 295 I=11,15
      WRITE (6,290) I,(TYPNM(I,K),K=1,5),ARETY(I)
  290 FORMAT (1H ,15X,I2,2X,5A2,4X,F12.1,4X,1H*)
  295 CONTINUE
      WRITE (6,300) ARECP
  300 FORMAT (1H0,99X,10HTOTAL AREA,2X,F12.1)
      WRITE (6,305)
  305 FORMAT (1H0,39X,57H***************  ACRES BY WORKING GROUPS  *****
     1**********)
      WRITE (6,310) ((WGPNM(I,J),J=1,3),I=1,NWGP)
  310 FORMAT (1H0,34X,5(3A4,3X))
      WRITE (6,315) (GRUP(I),I=1,NWGP)
  315 FORMAT (1H ,31X,5(F12.1,3X))
      WRITE (6,320) BARE
  320 FORMAT (1H0,5X,19HDEFORESTED ACRES -,F12.1)
C
C PRINT SUBCOMPARTMENT MAPS AND RELATED DATA.
C
      IF(MNK .EQ. 0) GO TO 500
      WRITE (6,250)
      WRITE (6,350) (FORET(I),I=1,19)
  350 FORMAT (1H ,16X,18A4,A2)
      WRITE (6,355) KOMP,KBK
  355 FORMAT (1H ,45X,37HSUBCOMPARTMENT MAP OF COMPARTMENT NO.,I4,20X,9H
     1BLOCK NO.,I2,/)
```

```
      DO 360 I=1,NROW
      WRITE (6,265) (KSUB(I,J),J=1,36)
  360 CONTINUE
      WRITE (6,365)
  365 FORMAT (1H0,16X,8HSUBCOMP.,6X,10HCOVER TYPE,10X,5HACRES,4X,1H*,4X,
     18HSUBCOMP.,6X,10HCOVER TYPE,10X,5HACRES,/)
      DO 385 I=1,MNK
      J = I + MNK
      MOL = SUBTY(I)
      JAM = SUBTY(J)
      IF(MOL .EQ. 0) GO TO 390
      IF(JAM .EQ. 0) GO TO 375
      WRITE (6,370) I,SUBTY(I),(TYPNM(MOL,K),K=1,5),ARESC(I),J,SUBTY(J),
     1(TYPNM(JAM,K),K=1,5),ARESC(J)
  370 FORMAT (1H ,19X,I2,6X,F3.0,2X,5A2,4X,F9.1,4X,1H*,7X,I2,6X,F3.0,2X,
     15A2,4X,F9.1)
      GO TO 385
  375 WRITE (6,380) I,SUBTY(I),(TYPNM(MOL,K),K=1,5),ARESC(I)
  380 FORMAT (1H ,19X,I2,6X,F3.0,2X,5A2,4X,F9.1,4X,1H*)
  385 CONTINUE
  390 WRITE (6,395) SARSC
  395 FORMAT (1H0,82X,10HTOTAL AREA,2X,F9.1)
      WRITE (6,305)
      WRITE (6,405) ((WGPNM(I,J),J=1,3),I=1,NWGP)
  405 FORMAT (1H0,34X,5(3A4,3X))
      WRITE (6,410) (GRUP(I),I=1,NWGP)
  410 FORMAT (1H ,31X,5(F12.1,3X))
      WRITE (6,415) BARE
  415 FORMAT (1H0,5X,18HDEFORESTED ACRES -,F12.1)
      GO TO 500
C
C PRINT PAGE TYPE 5 - AREAS ONLY IF MAPS NOT DESIRED.
C
  450 WRITE (6,250)
      WRITE (6,255) (FORET(I),I=1,19)
      WRITE (6,460) KOMP,KBK
  460 FORMAT (1H ,48X,29HTYPE AREAS OF COMPARTMENT NO.,I4,24X,9HBLOCK NO
     1.,I2)
      WRITE (6,275)
      DO 465 I=1,10
      J = I + 15
      N = I + 25
      WRITE (6,280) I,(TYPNM(I,K),K=1,5),ARETY(I),J,(TYPNM(J,K),K=1,5),
     1ARETY(J),N,(TYPNM(N,K),K=1,5),ARETY(N)
  465 CONTINUE
      DO 468 I=11,15
      WRITE (6,290) I,(TYPNM(I,K),K=1,5),ARETY(I)
  468 CONTINUE
      WRITE (6,300) ARECP
      IF(MNK .EQ. 0) GO TO 500
      WRITE (6,470) (FORET(I),I=1,19)
  470 FORMAT (1H0,//,16X,18A4,A2)
      WRITE (6,475) KOMP,KBK
  475 FORMAT (1H ,27X,34HSUBCOMPARTMENTS OF COMPARTMENT NO.,I4,21X,9HBLO
     1CK NO.,I2)
      WRITE (6,365)
      DO 485 I=1,MNK
      J = I + MNK
      MOL = SUBTY(I)
      JAM = SUBTY(J)
      IF(MOL .EQ. 0) GO TO 490
      IF(JAM .EQ. 0) GO TO 480
      WRITE (6,370) I,SUBTY(I),(TYPNM(MOL,K),K=1,5),ARESC(I),J,SUBTY(J),
     1(TYPNM(JAM,K),K=1,5),ARESC(J)
      GO TO 485
  480 WRITE (6,380) I,SUBTY(I),(TYPNM(MOL,K),K=1,5),ARESC(I)
  485 CONTINUE
  490 WRITE (6,395) SARSC
      WRITE (6,305)
      WRITE (6,310) ((WGPNM(I,J),J=1,3),I=1,NWGP)
      WRITE (6,315) (GRUP(I),I=1,NWGP)
      WRITE (6,320) BARE
C
C WHEN STAND AREAS ARE KNOWN AND INVENTORY DATA REFER TO THE STAND,
C VALUES OF ARESC(I), KBK, AND KOMP MAY BE EXTRACTED AT THIS POINT FOR
C MACHINE ADDITION OF ARESC(I) TO APPROPRIATE INVENTORY RECORDS.
C
  500 CONTINUE
C
C GET WORKING CIRCLE TOTALS FROM BLOCK TOTALS.
C
      DO 550 I=1,NBK
      DO 550 J=1,35
  550 STYP(J) = STYP(J) + SARETY(I,J)
      DO 555 I=1,NBK
      SBARB = SBARB + SARETY(I,26)
      SBARG = SBARG + SARETY(I,27)
      SLAND = SLAND + ARBK(I)
      NSUB = NSUB + NSBK(I)
      DO 555 J=1,NWGP
  555 SMSP(J) = SMSP(J) + ACSP(J,I)
      SBARE = SBARB + SBARG
      DO 558 I=1,NBK
      TEM = 0.0
      DO 556 J=28,35
  556 TEM = TEM + SARETY(I,J)
  558 TMPO = TMPO + ARBK(I) - TEM
C
C PRINT PAGE TYPE 6 - SUMMARY OF BLOCK AND WORKING CIRCLE AREAS.
C
      WRITE (6,560)
  560 FORMAT (1H1,////,59X,11HPAGE TYPE 6)
      WRITE (6,565)
  565 FORMAT (1H0,44X,40HTOTAL AREAS OF BLOCKS AND WORKING CIRCLE)
      WRITE (6,255) (FORET(I),I=1,19)
      WRITE (6,570)
  570 FORMAT (1H0,//,2X,5HBLOCK,5X,5HTOTAL,5X,6HNUMBER,6X,31H* PLANTABLE
     1 ACRES FOREST SOIL *,7X,60H******** FOREST AND REGENERATING BY WOR
     2KING GROUPS *********)
      WRITE (6,575) ((WGPNM(I,J),J=1,3),I=1,NWGP)
  575 FORMAT (1H ,2X,3HNO.,6X,5HACRES,4X,8HSUBCOMPT,6X,6HBRUSHY,6X,
     16HGRASSY,7X,5HTOTAL,5X,5(3A4,1X))
      WRITE (6,580)
  580 FORMAT (1H0)
      DO 590 I=1,NBK
      WRITE (6,585) I,ARBK(I),NSBK(I),SARETY(I,26),SARETY(I,27),
     1ACBAR(I),(ACSP(K,I),K=1,NWGP)
  585 FORMAT (1H0,2X,I2,3X,F10.1,4X,I5,4X,F10.1,2X,F10.1,2X,F10.1,2X,
     15(3X,F10.1))
  590 CONTINUE
      WRITE (6,595) SLAND,NSUB,SBARB,SBARG,SBARE,(SMSP(I),I=1,NWGP)
  595 FORMAT (1H0,//,3X,5HTOTAL,F10.1,4X,I5,4X,F10.1,2X,F10.1,2X,
     1F10.1,5X,5(F10.1,3X))
      RETURN
      END
```

Subroutine AREA1

```
      SUBROUTINE AREA1
C
C TO COMPUTE AREAS FOR WORKING CIRCLE FROM TOTAL AREA OF EACH TYPE IN
C EACH COMPARTMENT.
C
      COMMON ADO,AGE(2),AGEO,BA(2),BAS(2),BASO,BAST,BAUS,BFMRCH,BEVOL,
     1CEVOL,DATE(6),DBH(2),DBHE,DBHO,DBHT,DEN(2),DENO,DENT,DMUS,FBA(2),
     2FCTR(2),FDM(2),FDN(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSO,
     3HTST,KAK,KNO,MIN,MNK,NBK,NCMP,NSUB,NWGP,PDBHE,PRET,PROD(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLAND,TBA(2),TDM(2),TEM,TIME,TMBR
     5,TMPO,TOT(2),TOTO,TOTT,TVL(2),VDM(2),VLUS,DMR(2)
      COMMON ABEAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBE(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BOMAI(5),BFAGE(5,15)
     2,BFINT(5),CEAGE(5,15),CFBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),DBHTH(5,14),DELAY(5),DENTH(5,14),DLEV(5),FNBD(5),
     4ENCU(5),GROWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),OPBO(5),OPCU(5),PAIBO(5),PAICU(5),POOR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBE(5),SHELT(5,2,14),SHWO(5,2,14),SMC(5),SMSP(5),
     7SUBBE(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     8WGNUM(5),WGPDES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),OPEN(7,27),PBRSI(7,14),PDCEN(7,27
     2),PDCER(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLT(
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBO(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      DIMENSION ARETY(35),GRUP(5)
C
      DO 5 I=1,NBK
      DO 5 J=1,35
    5 SARETY(I,J) = 0.0
      KOUNT = 0
      DO 155 KOL=1,NCMP
C
C INITIALIZE VARIABLES APPLICABLE TO A COMPARTMENT.
C
      ARECP = 0.0
      BARE = 0.0
      DO 10 I=1,NWGP
   10 GRUP(I) = 0.0
C
C READ AREA OF EACH TYPE, ONE COMPARTMENT AT A TIME.
C DATA CARD TYPES 15 AND 16.
C
      READ (5,15) KBK,KOMP
   15 FORMAT (2I4)
      READ (5,20) (ARETY(I),I=1,35)
   20 FORMAT (10F8.1)
C
C SUM AREAS OF TYPES TO GET COMPARTMENT AND BLOCK TOTALS.
C
      DO 25 I=1,35
      SARETY(KBK,I) = SARETY(KBK,I) + ARETY(I)
      ARECP = ARECP + ARETY(I)
   25 CONTINUE
      M=1
      N=5
      DO 35 I=1,NWGP
      DO 30 J=M,N
      GRUP(I) = GRUP(I) + ARETY(J)
   30 CONTINUE
      M = M + 5
      N = N + 5
   35 CONTINUE
      BARE = ARETY(26) + ARETY(27)
      ACBAR(KBK) = ACBAR(KBK) + BARE
      DO 40 I=1,NWGP
   40 ACSP(I,KBK) = ACSP(I,KBK) + GRUP(I)
      ARBK(KBK) = ARBK(KBK) + ARECP
C
C PRINT PAGE TYPE 5 - AREAS OF TYPES AND WORKING GROUPS BY COMPARTMENT.
C KOUNT CONTROLS PRINTER TO GET 2 COMPARTMENTS PER PAGE.
C
      KOUNT = KOUNT + 1
      IF(KOUNT .GT. 1) GO TO 85
      WRITE (6,70)
   70 FORMAT (1H1,  62X,11HPAGE TYPE 5)
      WRITE (6,75) (FORET(I),I=1,19)
   75 FORMAT (1H0,30X,18A4,A2)
      WRITE (6,80) KOMP,KBK
   80 FORMAT (1H0,48X,29HTYPE AREAS OF COMPARTMENT NO.,I4,24X,9HBLOCK NO
     1.,I2)
      GO TO 100
   85 WRITE (6,75) (FORET(I),I=1,19)
      WRITE (6,95) KOMP,KBK
   95 FORMAT (1H0,/,49X,29HTYPE AREAS OF COMPARTMENT NO.,I4,24X, 9HBLOCK
     1 NO.,I2)
  100 WRITE (6,105)
```

```
  105 FORMAT (1HO,17X,10HCOVER TYPE,13X,5HACRES,4X,1H*,6X,10HCOVFR TYPE
     1,13X,5HACRES,4X,1H*,6X,10HCOVER TYPE,13X,5HACRES,/)
      DO 115 I=1,10
      J = I + 15
      N = I + 25
      WRITE (6,110) I,(TYPNM(I,K),K=1,5),ARETY(I),J,(TYPNM(J,K),K=1,5),A
     1RETY(J),N,(TYPNM(N,K),K=1,5),ARETY(N)
  110 FORMAT (1H ,15X,I2,2X,5A2,4X,F12.1,4X,1H*,4X,I2,2X,5A2,4X,F12.1,
     14X,1H*,4X,I2,2X,5A2,4X,F12.1)
  115 CONTINUE
      DO 125 I=11,15
      WRITE (6,120) I,(TYPNM(I,K),K=1,5),ARETY(I)
  120 FORMAT (1H ,15X,I2,2X,5A2,4X,F12.1,4X,1H*)
  125 CONTINUE
      WRITE (6,130) ARECP
  130 FORMAT (1H ,102X,10HTOTAL AREA,2X,F9.1)
      WRITE (6,135)
  135 FORMAT (1HO,39X,57H**************  ACRES BY WORKING GROUPS  *****
     1**********)
      WRITE (6,140) ((WGPNM(I,J),J=1,3),I=1,NWGP)
  140 FORMAT (1HO,34X,5(3A4,3X))
      WRITE (6,145) (GRUP(I),I=1,NWGP)
  145 FORMAT (1H ,31X,5(F12.1,3X))
      WRITE (6,150) BARE
  150 FORMAT (1HO,5X,18HOEFORESTED ACRES -,F12.1)
      IF(KOUNT .EQ. 2) KOUNT = 0
  155 CONTINUE
C
C GET WORKING CIRCLE TOTALS FROM BLOCK TOTALS.
C
      DO 200 I=1,NBK
      DO 200 J=1,35
  200 STYP(J) = STYP(J) + SARETY(I,J)
      DO 205 I=1,NBK
      SBARB = SBARB + SARETY(I,26)
      SBARG = SBARG + SARETY(I,27)
      SLAND = SLAND + ARBK(I)
      DO 205 J=1,NWGP
      SMSP(J) = SMSP(J) + ACSP(J,I)
  205 CONTINUE
      SBARE = SBARB + SBARG
      DO 215 I=1,NBK
      TEM = 0.0
      DO 210 J=28,35
  210 TEM = TEM + SARETY(I,J)
  215 TMPO = TMPO + ARBK(I) - TEM
C
C PRINT PAGE TYPE 6 - SUMMARY OF AREAS BY BLOCK AND WORKING CIRCLE.
C
      WRITE (6,240)
  240 FORMAT (1H1,////,59X,11HPAGE TYPE 6)
      WRITE (6,245)
  245 FORMAT (1HO,44X,40HTOTAL AREAS OF BLOCKS AND WORKING CIRCLE)
      WRITE (6,250) (FORET(I),I=1,19)
  250 FORMAT (1HO,29X,18A4,A2)
      WRITE (6,255)
  255 FORMAT (1HO,//,2X,5HBLOCK,8X,5HTOTAL,11X,31H* PLANTABLE ACRES FORE
     1ST SOIL *,10X,60H******** FOREST AND REGENERATING BY WORKING GROUP
     2S *********)
      WRITE (6,260) ((WGPNM(I,J),J=1,3),I=1,NWGP)
  260 FORMAT (1H ,2X,3HNO.,9X,5HACRES,12X,6HBRUSHY,6X,6HGRASSY,7X,
     15HTOTAL,8X,5(3A4,1X))
      DO 275 I=1,NBK
      WRITE (6,265)
  265 FORMAT (1HO)
      WRITE (6,270) I,ARBK(I),SARETY(I,26),SARETY(I,27),ACBAR(I),(ACSP(K
     1,I),K=1,NWGP)
  270 FORMAT (1HO,2X,I2,6X,F10.1,7X,F10.1,2X,F10.1,2X,F10.1,5X,5(3X,F10.
     11))
  275 CONTINUE
      WRITE (6,280) SLAND,SBARB,SBARG,SBARE,(SMSP(I),I=1,NWGP)
  280 FORMAT (1HO,//,3X,5HTOTAL,3X,F10.1,7X,F10.1,2X,F10.1,2X,F10.1,
     18X,5(F10.1,3X))
      RETURN
      END
```

Subroutine AREA2

```
      SUBROUTINE AREA2
C
C TO COMPUTE TYPE AREAS WHEN COMPARTMENT AREAS ARE NOT KNOWN.
C
      COMMON ADD,AGE(2),AGEO,BA(2),BAS(2),BASD,BAST,BAUS,BFMRCH,BFVOL,
     1CFVOL,DATE(6),DBH(2),DBHF,DBHO,DPHT,DFN(2),DENO,DENT,DMUS,FBA(2),
     2FCTR(2),FOM(2),FON(2),FHT(2),FORFT(19),FVL(2),HT(2),HTCUM,HTSO,
     3HTST,KAK,KNO,MIN,MNK,NBK,NCMP,NSUB,NWGP,PDBHE,PRET,PROD(2),RFST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLAND,TBA(2),TOM(2),TEM,TIME,TMBR
     5,TMPO,TOT(2),TOTO,TOTT,TVL(2),VOM(2),VLUS,OMR(2)
      COMMON ABFAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BOMAI(5),BFAGE(5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),DBHTH(5,14),DELAY(5),DENTH(5,14),OLEV(5),FNBD(5),
     4FNCU(5),GROWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),OPBO(5),OPCU(5),PAIBD(5),PAICU(5),POOR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBF(5),SHELT(5,2,14),SHWO(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     8WGNUM(5),WGPDES(5,20),WGPNM(5,3),SPNUM(5),TPR(5,7),PASP(5,7)
      COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),OPEN(7,27),PBRSI(7,14),POCFN(7,27
     2),PDCFR(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLT(
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBO(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      DIMENSION SPL(7)
C
C INITIALIZE VARIABLES DEFINED BY THIS SUBROUTINE.
C
      DO 5 I=1,NBK
      SPL(I) = 0.0
    5 CONTINUE
      TMPO = 0.0
C
C READ AREAS OF BLOCKS AND OF NON-TIMBER TYPES.
C DATA CARD TYPES 17 AND 18.
C
      READ (5,10) (ARBK(I),I=1,NBK)
   10 FORMAT (7F8.1)
      DO 20 I=1,NBK
      READ (5,15) (SARETY(I,J),J=28,35)
   15 FORMAT (8F8.1)
   20 CONTINUE
C
C COMPUTE TOTAL AREAS OCCUPIED BY TIMBER TYPES.
C
      DO 30 I=1,NBK
      TEM = 0.0
      DO 25 J=28,35
   25 TEM = TEM + SARETY(I,J)
      TMTY(I) = ARBK(I) - TEM - TMTY(I)
   30 TMPO = TMPO + ARBK(I) - TEM
C
C TOTAL PLOTS BY BLOCK.
C
      DO 35 I=1,NBK
      DO 35 J=1,27
   35 SPL(I) = SPL(I) + PSPLT(I,J)
C
C COMPUTE TYPE AREAS WITHIN EACH BLOCK.
C
      DO 45 I=1,NBK
      IF(SPL(I) .EQ. 0.0) GO TO 45
      TEM = TMTY(I) / SPL(I)
      DO 40 J=1,27
      SARETY(I,J) = SARETY(I,J) + (PSPLT(I,J) * TEM)
   40 CONTINUE
   45 CONTINUE
C
C SUM TYPE AREAS TO GET BLOCK AND WORKING CIRCLE TOTALS.
C
      DO 50 I=1,NBK
      DO 50 J=1,35
      STYP(J) = STYP(J) + SARETY(I,J)
   50 CONTINUE
      DO 55 I=1,NBK
      SBARB = SBARB + SARETY(I,26)
      SBARG = SBARG + SARETY(I,27)
      ACBAR(I) = ACBAR(I) + SARETY(I,26) + SARETY(I,27)
   55 CONTINUE
      DO 65 I=1,NBK
      M = 1
      N = 5
      DO 65 J=1,NWGP
      DO 60 K=M,N
   60 ACSP(J,I) = ACSP(J,I) + SARETY(I,K)
      M = M + 5
      N = N + 5
   65 CONTINUE
      SBARE = SBARB + SBARG
      DO 70 I=1,NBK
      SLAND = SLAND + ARBK(I)
      DO 70 J=1,NWGP
      SMSP(J) = SMSP(J) + ACSP(J,I)
   70 CONTINUE
C
C WRITE PAGE TYPE 5 - AREAS OF TYPES AND WORKING GROUPS.
C
      WRITE (6,75)
   75 FORMAT (1H1,////,59X,11HPAGE TYPE 5)
      WRITE (6,80) (FORET(I),I=1,19)
   80 FORMAT (1HO,48X,32HAREAS OF TYPES IN WORKING CIRCLE/1H ,27X,18A4,A
     12,/1HO,17X,10HCOVER TYPE,11X,5HACRES,6X,1H*,6X,10HCOVER TYPE,11X,5
     2HACRES,6X,1H*,6X,10HCOVER TYPE,11X,5HACRES,/)
      DO 90 I=1,10
      J = I + 15
      N = I + 25
      WRITE (6,85) I,(TYPNM(I,K),K=1,5),STYP(I),J,(TYPNM(J,K),K=1,5),
     1STYP(J),N,(TYPNM(N,K),K=1,5),STYP(N)
   85 FORMAT (1HG,15X,I2,2X,5A2,4X,F12.1,4X,1H*,4X,I2,2X,5A2,4X,F12.1,
     14X,1H*,4X,I2,2X,5A2,4X,F12.1)
   90 CONTINUE
      DO 100 I=11,15
      WRITE (6,95) I,(TYPNM(I,K),K=1,5),STYP(I)
   95 FORMAT (1HO,15X,I2,2X,5A2,4X,F12.1,4X,1H*)
  100 CONTINUE
      WRITE (6,110) SLAND
  110 FORMAT (1HO,99X,10HTOTAL AREA,2X,F12.1)
      WRITE (6,120)
  120 FORMAT (1HO,//,39X,57H**************  ACRES BY WORKING GROUPS  **
     1*************)
      WRITE (6,130) ((WGPNM(I,J),J=1,3),I=1,NWGP)
  130 FORMAT (1HO,34X,5(3A4,3X))
      WRITE (6,140) (SMSP(I),I=1,NWGP)
  140 FORMAT (1H ,31X,5(F12.1,3X))
      WRITE (6,150) SBARE
  150 FORMAT (1HO,/,/,/,5X,18HOEFORESTED ACRES -,F12.1)
C
C PRINT PAGE TYPE 6 - SUMMARY OF AREAS BY BLOCK AND WORKING CIRCLE.
C
      WRITE (6,200)
  200 FORMAT (1H1,////,59X,11HPAGE TYPE 6)
      WRITE (6,205)
  205 FORMAT (1HO,44X,40HTOTAL AREAS OF BLOCKS AND WORKING CIRCLE)
      WRITE (6,210) (FORET(I),I=1,19)
  210 FORMAT (1H ,27X,18A4,A2)
      WRITE (6,215)
```

```
215 FORMAT (1H0,//,2X,5HBLOCK,8X,5HTOTAL,11X,31H* PLANTABLE ACRES FORE
    1ST SOIL *,10X,60H******** FOREST AND REGENERATING BY WORKING GROUP
    2S ********)
    WRITE (6,220) ((WGPNM(I,J),J=1,3),I=1,NWGP)
220 FORMAT (1H ,2X,3HNO.,9X,5HACRES,11X,6HBRUSHY,6X,6HGRASSY,7X,5HTOTA
    1L,9X,5(3A4,1X))
    DO 235 I=1,NBK
    WRITE (6,225)
225 FORMAT (1H0)
    WRITE (6,230) I,ARBK(I),SARETY(I,26),SARETY(I,27),ACBAR(I),(ACSP(K
    1,I),K=1,NWGP)
230 FORMAT (1H0,2X,I2,6X,F10.1,7X,F10.1,2X,F10.1,2X,F10.1,8X,F10.1,3X,
    1F10.1,3X,F10.1,3X,F10.1,3X,F10.1)
235 CONTINUE
    WRITE (6,240) SLAND,SBARB,SBARG,SBARE,(SMSP(I),I=1,NWGP)
240 FORMAT (1H0,//,3X,5HTOTAL,3X,F10.1,7X,F10.1,2X,F10.1,2X,F10.1,
    18X,5(F10.1,3X))
    RETURN
    END
```

Subroutine LAND

```
      SUBROUTINE LAND
C
C TO COMPUTE AREAS OF VARIOUS SUBDIVISIONS OF THE WORKING CIRCLE.
C
      COMMON AOD,AGE(2),AGEO,BA(2),BAS(2),BASD,BAST,BAUS,BFMRCH,BFVOL,
     1CFVOL,DATE(6),DBH(2),DBHE,DBHO,DBHT,DEN(2),DEND,DENT,DMUS,FBA(2),
     2FCTR(2),FDM(2),FDN(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSD,
     3HTST,KAK,KNO,MIN,MNK,NBK,NCMP,NSUB,NWGP,PDBHE,PRET,PROD(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLAND,TBA(2),TDM(2),TEM,TIME,TMBR
     5,TMPD,TOT(2),TDTD,TOTT,TVL(2),VDM(2),VLUS,DMR(2)
      COMMON ABFAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BDMAI(5),BFAGE(5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),DBHTH(5,14),DELAY(5),DENTH(5,14),DLEV(5),FNBD(5),
     4FNCU(5),GRDWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),OPBO(5),OPCU(5),PAIBD(5),PAICU(5),PODR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBF(5),SHELT(5,2,14),SHWD(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     8WGNUM(5),WGPDES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),OPEN(7,27),PBRSI(7,14),POCFN(7,27
     2),POCFR(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLT(
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBD(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
C COMPUTE AREAS NOT IN SUBCOMPARTMENTS OF KNOWN AREA.
C
      DO 5 I=1,NWGP
      DO 5 J=1,NBK
    5 PASP(I,J) = ACSP(I,J) - PASP(I,J)
      DO 10 I=1,NBK
      DO 10 J=1,35
   10 PARTY(I,J) = SARETY(I,J) - PARTY(I,J)
      DO 15 I=1,NBK
      DO 15 J=1,25
   15 TMBR = SARETY(I,J) + TMBR
      DO 20 I=1,NBK
   20 PABR(I) = PARTY(I,26) + PARTY(I,27)
C
C SUM ACRES BY WORKING GROUP, BLOCK, AND SITE CLASS.
C
      DO 30 I=1,NBK
      TEM = PSPLT(I,26) + PSPLT(I,27)
      IF(TEM .EQ. 0.0) GO TO 30
      DO 25 J=1,14
      PBRSI(I,J) = PBRSI(I,J) * (PABR(I) / TEM)
   25 CONTINUE
   30 CONTINUE
      DO 35 I=1,NBK
      DO 35 J=1,14
   35 BARSI(I,J) = BARSI(I,J) + PBRSI(I,J)
      M = 1
      N = 5
      DO 45 I=1,NWGP
      DO 40 J=1,NBK
      DO 40 K=M,N
   40 TPB(I,J) = TPB(I,J) + PSPLT(J,K)
      M = M + 5
      N = N + 5
   45 CONTINUE
C
C COMPUTE AREAS BY WORKING GROUP, BLOCK, AND SITE CLASS.
C
      IF(TMBR .EQ. 0.0) GO TO 90
      DO 50 K=1,NWGP
      DO 50 I=1,NBK
      DO 50 J=1,14
      IF(TPB(K,I) .EQ. 0.0) GO TO 50
      PASI(K,I,J) = PASP(K,I) * PS(K,I,J) / TPB(K,I)
   50 CONTINUE
      DO 55 I=1,NWGP
      DO 55 J=1,NBK
      DO 55 K=1,14
   55 ACSI(I,J,K) = ACSI(I,J,K) + PASI(I,J,K)
C
C PRINT PAGE TYPE 7 - AREAS BY SITE INDEX CLASS.
C
   90 WRITE (6,100)
  100 FORMAT (1H1,////,60X,11HPAGE TYPE 7)
      WRITE (6,105)
  105 FORMAT (1H0,/,46X,40HDISTRIBUTION OF AREA BY SITE INDEX CLASS)
      WRITE (6,110) (FORET(I), I=1,19)
  110 FORMAT (1H ,28X,18A4,A2)
      WRITE (6,115) ((WGPNM(I,J),J=1,3),I=1,NWGP)
  115 FORMAT (1H0,//,5X,5HBLOCK,10X,10HSITE INDEX,6X,16HDEFORESTED ACRES
     1,2X,5(3X,3A4))
      WRITE (6,120)
  120 FORMAT (1H0)
      KOUNT = 1
      DO 155 I=1,NBK
      IF(ARBK(I) .EQ. 0.0) GO TO 155
      KOUNT = KOUNT + 1
      IF(KOUNT .EQ. 4) GO TO 125
      GO TO 135
  125 WRITE (6,130)
  130 FORMAT (1H1,//,56X,18HPAGE TYPE 7, CONT.,//)
      WRITE (6,115) ((WGPNM(K,J),J=1,3),K=1,NWGP)
      WRITE (6,120)
  135 DO 150 J=1,14
      MNK = J * 10
      WRITE (6,140) I,MNK,BARSI(I,J),(ACSI(K,I,J),K=1,NWGP)
  140 FORMAT (1H ,6X,I2,16X,I3,10X,F10.1,2X,5(5X,F10.1))
      IF(MNK .LT. 140) GO TO 150
      WRITE (6,120)
  150 CONTINUE
  155 CONTINUE
      WRITE (6,160) SBARE,(SMSP(I),I=1,NWGP)
  160 FORMAT (1H0,//,10X,5HTOTAL,21X,F12.1,2X,5(3X,F12.1))
C
C ASSIGN PART OF DEFORESTED AREA TO EACH WORKING GROUP.
C
      DO 215 I=1,NBK
      TEM = 0.0
      DO 200 J=1,NWGP
  200 TEM = ACSP(J,I) + TEM
      IF(TEM .EQ. 0.0) GO TO 215
      DO 210 K=1,NWGP
      FF = ACSP(K,I) / TEM
      DO 205 J=1,14
      ACSI(K,I,J) = ACSI(K,I,J) + BARSI(I,J) * FF
  205 CONTINUE
  210 CONTINUE
  215 CONTINUE
      DO 220 I=1,NWGP
      DO 220 J=1,NBK
      DO 220 K=1,14
  220 SARSP(I) = SARSP(I) + ACSI(I,J,K)
      DO 225 KAK=1,NWGP
      DO 225 I=1,NBK
      DO 225 J=1,14
  225 AREA(KAK,J) = AREA(KAK,J) + ACSI(KAK,I,J)
      RETURN
      END
```

Subroutine GOAL

```
      SUBROUTINE GOAL
C
C TO COMPUTE GROWING STOCK NEEDED TO MEET MANAGEMENT OBJECTIVES.
C
      COMMON ADD,AGE(2),AGEO,BA(2),BAS(2),BASD,BAST,BAUS,BFMRCH,BFVOL,
     1CFVOL,DATE(6),DBH(2),DBHE,DBHO,DBHT,DEN(2),DEND,DENT,DMUS,FBA(2),
     2FCTR(2),FDM(2),FDN(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSO,
     3HTST,KAK,KNO,MIN,MNK,NBK,NCMP,NSUB,NWGP,PDBHE,PRET,PROD(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLAND,TBA(2),TDM(2),TEM,TIME,TMBR
     5,TMPO,TOT(2),TDTD,TOTT,TVL(2),VOM(2),VLUS,DMR(2)
      COMMON ABFAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BDMAI(5),BFAGE(5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),DBHTH(5,14),DELAY(5),DENTH(5,14),DLEV(5),FNBD(5),
     4FNCU(5),GRDWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),OPBO(5),OPCU(5),PAIBD(5),PAICU(5),PODR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBF(5),SHELT(5,2,14),SHWD(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     8WGNUM(5),WGPDES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),OPEN(7,27),PBRSI(7,14),POCFN(7,27
     2),POCFR(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLT(
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBD(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      COMMON /BLKA/ ANBDF(151),ANCUV(151),BDFC(150),BDFD(150),CFMC(150),
     1CFMD(150),CYCL,IROT,KAN,PO1,PD2,QUAL(14),ROTA,VLBF(14),VLCU(14)
C
      COMMON /BLKD/ IJ,IK,KI,VOL,TVOL
C
      DIMENSION BFS(15),CMS(15),EDIV(14),EQVCF(14),FACCF(14),FAC(14),
     1PDCUT(16),STACF(14),STDAC(14)
C
      DO 600 KAK=1,NWGP
C
C ZERO VARIABLES COMMON TO ALL SITES.
C
      CYCL = 0.0
      SACCF = 0.0
      SSTAC = 0.0
      DO 40 I=1,14
      EDIV(I) = 0.0
      EQVCF(I) = 0.0
      FACCF(I) = 0.0
      FAC(I) = 0.0
      QUAL(I) = 0.0
      STACF(I) = 0.0
      STDAC(I) = 0.0
      VLBF(I) = 0.0
   40 VLCU(I) = 0.0
      STOR = DLEV(KAK)
C
C COMPUTE LOOP INDEXES FOR NUMBER OF SITE CLASSES INCLUDED IN GOALS.
C
      SITE = PODR(KAK)
      KSI = PODR(KAK) * 0.1
      KND = KSI + NSI(KAK) - 1
      IF(KND .GT. 14) KND = 14
C
```

```
C ENTER FOLLOWING LOOP ONCE FOR EACH SITE CLASS OF A WORKING GROUP.
C
      OO 400 KAN=KSI,KND
      PD1 = INVL(KAK,1,KAN)
      PO2 = INVL(KAK,2,KAN)
      OUAL(KAN) = SITE
      AGEO = AGETH(KAK,KAN)
      OBH3 = OBHTH(KAK,KAN)
      OEND = OENTH(KAK,KAN)
C
C OETERMINE OLDEST AGE TO BE REPRESENTED IN YIELD TABLE.
C
      OO 45 NA=1,3
      L = 4 - NA
      IF(REGN(KAK,L,KAN) .EO. 0.0) GO TO 45
      ROTA = REGN(KAK,L,KAN)
      GO TO 50
   45 CONTINUE
   50 IF(AGEO .EO. D.0 .DR. AGEO .GT. ROTA) GO TO 405
      IF(AREA(KAK,KAN) .EO. 0.0) GO TO 390
C
C INITIALIZE VARIABLES RECOMPUTED FOR EACH SITE CLASS.
C
      ACTEM = 0.0
      BDAI = 0.0
      BFTEM = 0.0
      CFAI = 0.0
      CFTEM = 0.0
      DO 55 I=1,15
      BFS(I) = 0.0
   55 CMS(I) = 0.0
      OO 60 I=1,16
   60 PDCUT(I) = 0.0
      CYCL = CUCY(KAK)
C
C COMPUTE YIELD TABLE FOR EACH SITE CLASS OF EACH WORKING GROUP.
C
      CALL YIELO
C
C PRINT PAGE TYPE 9 - ANNUAL VOLUMES PER ACRE.
C
C WRITE TABLE HEADINGS.
C
      OLEV(KAK) = STOR
      WRITE (6,100)
  100 FORMAT (1H1,//,61X,11HPAGE TYPE 9)
      WRITE (6,105) QUAL(KAN),CUCY(KAK),THIN(KAK),OLEV(KAK)
  105 FORMAT (IH0,41X,53HGROWING STOCK OF MANAGED, REGULATED, EVEN-AGED
     1STANDS/1H ,47X,10HSITE INOEX,F5.0,1H,,F5.0,19H-YEAR CUTTING CYCLE/
     21H ,53X,14HDENSITY LEVEL-,F5.0,1X,3HANO,F5.0)
      WRITE (6,110) (WGPNM(KAK,J),J=1,3)
  110 FORMAT (1H0,53X,I6HWORKING GROUP - ,3A4,/)
      WRITE (6,115)
  115 FORMAT (IH0,43X,44HVOLUMES PRESENT PER ACRE AT END OF EACH YEAR,/)
      WRITE (6,120)
  120 FORMAT (1H0,54X,23HMERCHANTABLE CUBIC FEET/1H0,64X,4HYEAR/1H ,14X,
     16HOECADE,9X,1H0,9X,1H1,9X,1H2,9X,1H3,9X,1H4,9X,1H5,9X,1H6,9X,1H7,9
     2X,1H8,9X,1H9,//)
C
C WRITE CUBIC FEET PER ACRE FOR EACH YEAR.
C
      K = 0
      WRITE (6,125) K,(ANCUV(NN),NN=I,I0)
  125 FORMAT (1H ,I20,F13.I,9F10.1)
      MNK = ROTA * 0.1 - I.0 + 0.5
      OO 130 J=1,MNK
      NN = 10 * J + 1
      WRITE (6,125) J,ANCUV(NN),ANCUV(NN+1),ANCUV(NN+2),ANCUV(NN+3),
     1ANCUV(NN+4),ANCUV(NN+5),ANCUV(NN+6),ANCUV(NN+7),ANCUV(NN+8),
     2ANCUV(NN+9)
  130 CONTINUE
      J = ROTA * 0.1 + 0.5
      ANCUV(IROT+1) = CFMO(IRDT)
      WRITE (6,125) J,ANCUV(IROT+1)
C
C WRITE BOARD FEET PER ACRE FOR EACH YEAR.
C
      WRITE (6,135)
  135 FORMAT (1H0,///,55X,23HTHOUSANDS OF BOARD FEET,//)
      WRITE (6,140) K,(ANBDF(NN),NN=1,10)
  140 FORMAT (1H ,I20,F13.3,9F10.3)
      OD 145 J=1,MNK
      NN = 10 * J + 1
      WRITE (6,140) J,ANBDF(NN),ANBDF(NN+1),ANBOF(NN+2),ANBDF(NN+3),
     1ANBOF(NN+4),ANBOF(NN+5),ANBOF(NN+6),ANBDF(NN+7),ANBDF(NN+8),
     2ANBOF(NN+9)
  145 CONTINUE
      J = ROTA * 0.1 + 0.5
      ANBOF(IROT+1) = BOFO(IRDT)
      WRITE (6,140) J,ANBOF(IRDT+1)
C
C COMPUTE M.A.I. FOR EACH WORKING GROUP AND SITE CLASS.
C
      TEM = 0.0
      REM = 0.0
      IF(REGN(KAK,2,KAN) .EQ. 0.0) GO TO 160
      MNK = REGN(KAK,1,KAN)
      GO TO 165
  160 MNK = REGN(KAK,1,KAN) - OELAY(KAK)
  165 OO 170 I=1,MNK
      TEM = TEM + BOFC(I)
  170 REM = REM + CFMC(I)
      REM = REM * 0.0I
      MNK = MNK + I
      BOAI = ANBOF(MNK) + (SHELT(KAK,1,KAN) * GROWB(KAK,1,KAN) * POI) +
     1(SHELT(KAK,2,KAN) * GROWB(KAK,2,KAN) * PO2) + TEM
      BOAI = BOAI / REGN(KAK,1,KAN)
      CFAI = ANCUV(MNK) * 0.01 + (SHWO(KAK,1,KAN) * 0.01 * GROWC(KAK,1,K
     1AN) * PO1) + (SHWO(KAK,2,KAN) * 0.01 * GROWC(KAK,2,KAN) * PD2) + R
     2EM
      CFAI = CFAI / REGN(KAK,1,KAN)
      BDMAI(KAK) = BOMAI(KAK) + BOAI * AREA(KAK,KAN)
      CUMAI(KAK) = CUMAI(KAK) + CFAI * AREA(KAK,KAN)
C
C COMPUTE ACRES IN EACH AGE CLASS WITH IOEAL CONDITIONS.
C
      ANCUT(KAK,KAN) = AREA(KAK,KAN) / REGN(KAK,1,KAN)
C
C CHANGE VALUE OF CLASS IF AGE CLASSES ARE NOT 10 YEARS.
C
      CLASS = I0.0
      TEM = ANCUT(KAK,KAN) * CLASS
      IF(OELAY(KAK) .EO. 0.0) GO TO 180
      IF(REGN(KAK,2,KAN) .GT. 0.0) GO TO 180
      PDCUT(1) = ANCUT(KAK,KAN) * OELAY(KAK)
      MNK = (REGN(KAK,1,KAN) - DELAY(KAK) + 9.5) * 0.1
      KK = MNK + 1
      OO 175 I=2,MNK
  175 PDCUT(I) = TEM
      TEM = MNK - 1
      TEM = REGN(KAK,1,KAN) - OELAY(KAK) - (CLASS * TEM)
      PDCUT(KK) = ANCUT(KAK,KAN) * TEM
      GO TO 190
  180 MNK = ((REGN(KAK,1,KAN) + 9.5) * 0.1) + 1.0
      DO 185 I=2,MNK
  185 PDCUT(I) = TEM
C
C COMPUTE GROWING STOCK IN EACH AGE CLASS WITH IDEAL CONDITIONS.
C
  190 MAX = REGN(KAK,1,KAN) - DELAY(KAK) + 1.0
      DO 200 I=1,MAX
      IF(ANBDF(I) .LT. BFMRCH) GD TO 200
      MIO = I
      GO TO 205
  200 CONTINUE
  205 MES = MID - 1
      MUO = MIN + 1
      DD 210 J=MUO,MES
  210 SUBCF(KAK,KAN) = SUBCF(KAK,KAN) + ANCUV(J) * 0.01
      SUBCF(KAK,KAN) = SUBCF(KAK,KAN) * ANCUT(KAK,KAN)
      DO 215 K=MIO,MAX
  215 CFBF(KAK,KAN) = CFBF(KAK,KAN) + ANCUV(K) * 0.01
      CFBF(KAK,KAN) = CFBF(KAK,KAN) * ANCUT(KAK,KAN)
      IF(REGN(KAK,2,KAN) .EO. 0.0) GD TO 220
      MAX = REGN(KAK,2,KAN) + 1.0
      IF(REGN(KAK,3,KAN) .GT. 0.0) MAX = REGN(KAK,3,KAN) + 1.0
  220 OD 240 I=1,15
      DO 230 J=2,I1
      K = J + I0 * I - 10
      IF(K .GT. MAX) GO TO 250
      IF(K .LT. MUD) GO TO 230
      CMS(I) = CMS(I) ^ ANCUV(K) * 0.01
      IF(K .LT. MID) GO TO 230
      BFS(I) = BFS(I) + ANBOF(K)
  230 CONTINUE
  240 CONTINUE
  250 DO 255 L=1,15
      BFS(L) = BFS(L) * ANCUT(KAK,KAN)
      CMS(L) = CMS(L) * ANCUT(KAK,KAN)
  255 CONTINUE
      DO 260 I=1,15
      ALLCF(KAK,KAN) = ALLCF(KAK,KAN) + CMS(I)
  260 SUBBF(KAK,KAN) = SUBBF(KAK,KAN) + BFS(I)
      GVLBF(KAK) = GVLBF(KAK) + SUBBF(KAK,KAN)
      GVLCU(KAK) = GVLCU(KAK) + SUBCF(KAK,KAN)
C
C COMPUTE POTENTIAL ANNUAL CUTS WITH BALANCED OISTRIBUTION OF AGE
C CLASSES ANO OPTIMUM GROWING STOCK FOR OBJECTIVES.
C INTERMEDIATE, REGENERATION, AND FINAL CUTS KEPT SEPARATE HERE.
C
      IF(REGN(KAK,2,KAN) .EO. 0.0) GO TD 285
      DO 280 J=1,2
      IF(J .EQ. 1) GO TD 270
      IF(REGN(KAK,3,KAN) .EO. 0.0) GO TO 280
  270 MNK = REGN(KAK,J,KAN)
      TEM = CFMC(MNK) * 0.01
      TMPY = BDFC(MNK)
      IF(TMPY .LT. COMBF(KAK)) GO TO 275
      OPBD(KAK) = OPBD(KAK) + TMPY * ANCUT(KAK,KAN)
      GO TO 280
  275 IF(TEM .LT. COMCU(KAK)) GO TO 280
      OPCU(KAK) = OPCU(KAK) + TEM * ANCUT(KAK,KAN)
  280 CONTINUE
      GO TO 300
  285 MNK = REGN(KAK,1,KAN) - DELAY(KAK) + 1.0
      IF(ANBDF(MNK) .LT. COMBF(KAK)) GO TD 290
      DPBO(KAK) = OPBO(KAK) + ANBDF(MNK) * ANCUT(KAK,KAN)
      GD TO 300
  290 TEM = ANCUV(MNK) * 0.01
      IF(TEM .LT. COMCU(KAK)) GO TO 300
      DPCU(KAK) = OPCU(KAK) + TEM * ANCUT(KAK,KAN)
  300 IF(REGN(KAK,2,KAN) .EQ. 0.0) GD TO 315
      DD 310 J=2,3
      IF(J .EO. 3) GO TO 302
      IF(REGN(KAK,3,KAN) .GT. 0.0) GO TO 310
      GO TO 303
  302 IF(REGN(KAK,3,KAN) .EO. 0.0) GO TO 310
  303 MNK = REGN(KAK,J,KAN) + 1.0
      TEM = ANBOF(MNK)
      IF(TEM .LT. COMBF(KAK)) GO TO 305
      FNBO(KAK) = FNBO(KAK) + TEM * ANCUT(KAK,KAN)
      GO TO 310
  305 TEM = ANCUV(MNK) * 0.01
      IF(TEM .LT. COMCU(KAK)) GO TO 310
      FNCU(KAK) = FNCU(KAK) + TEM * ANCUT(KAK,KAN)
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  310 CONTINUE
  315 MNK = REGN(KAK,1,KAN) - 3.Q
      NR = CUCY(KAK)
      N1 = AGETH(KAK,KAN)
      DO 325 I=N1,MNK,NR
      ACTEM = ACTEM + 1.0
      IF(BDFC(I) .LT. COMBF(KAK)) GO TO 320
      BFTEM = BFTEM + BOFC(I)
      GO TO 325
  320 TEM = CFMC(I) * 0.01
      IF(TEM .LT. COMCU(KAK)) GO TO 325
      CFTEM = CFTEM + TEM
  325 CONTINUE
      ACINT(KAK) = ACINT(KAK) + ACTEM * ANCUT(KAK,KAN)
      BFINT(KAK) = BFINT(KAK) + BFTEM * ANCUT(KAK,KAN)
      CUINT(KAK) = CUINT(KAK) + CFTEM * ANCUT(KAK,KAN)
C
C PRINT PAGE TYPE 1D - GROWING STOCK GOALS BY WORKING GROUP AND SITE.
C
      WRITE (6,350)
  350 FORMAT (1H1,//,58X,12HPAGE TYPE 10,/)
      WRITE (6,352) QUAL(KAN),REGN(KAK,1,KAN),AREA(KAK,KAN)
  352 FORMAT (1HD,41X,44HOISTRIBUTION OF AREA AND GROWING STOCK GOALS/1H
     10,16X,21HFOR SITE INDEX CLASS-,F5.D,I1H, ROTATION-,F5.D,5H, ANO,F1
     20.1,35H ACRES OF THIS SITE CLASS AND GROUP)
      WRITE I6,110) (WGPNM(KAK,J),J=1,3)
      WRITE (6,354)
  354 FORMAT (1HO,44X,BHACRES IN,13X,1IHHUNOREDS OF/1H ,23X,9HAGE CLASS,
     114X,5HCLASS,16X,7HCU. FT.,17X,9HM BD. FT.,/)
      IF(REGN(KAK,2,KAN) .GT. 0.0) GO TO 360
      IF(OELAY(KAK) .EO. 0.0) GO TO 360
      WRITE (6,356) POCUT(1)
  356 FORMAT (1HO,27X,1H0,14X,F10.1)
  360 DO 364 I=2,16
      J = I - 1
      MNK = 1 + 1D * I - 2D
      MO = MNK + 9
      WRITE (6,362) MNK,MO,PDCUT(I),CMS(J),BFS(J)
  362 FORMAT (1HD,24X,I3,1H-,I3,11X,F10.1,1DX,F15.1,10X,F15.1)
  364 CONTINUE
      WRITE (6,366) AREA(KAK,KAN),ALLCF(KAK,KAN),SUBBF(KAK,KAN)
  366 FORMAT (1H0,//,26X,6HTOTALS,11X,F1D.1,10X,F15.1,1DX,F15.1)
      IF(REGN(KAK,2,KAN) .GT. D.0) GO TO 37D
      IF(DELAY(KAK) .EQ. D.D) GO TO 370
      WRITE (6,368) DELAY(KAK)
  368 FORMAT (1H0,//,17X,80HAGE CLASS ZERO REPRESENTS CLEARCUT ACRES NOT
     1 YET REFORESTED BECAUSE OF DELAY OF ,F4.D,6H YEARS/1H ,46HEXPECTED
     2 AFTER SCHEDULEO REGENERATION CUTTING.)
  37D 00 375 I=1,I5
      BFAGE(KAK,I) = BFAGE(KAK,I) + BFS(I)
  375 CFAGE(KAK,I) = CFAGE(KAK,I) + CMS(I)
  39D SITE = SITE + 10.0
  40D CONTINUE
  4D5 DO 410 I=KSI,KND
  41D SUMCF(KAK) = SUMCF(KAK) + ALLCF(KAK,I)
C
C COMPUTE STANDARO ACRES FOR SITE CLASSES.
C
      TEM = NSI(KAK)
      MNK = TEM * D.5 + 0.5
      MNK = MNK + KSI - 1
      DO 420 I=KSI,KND
      IF(VLBF(MNK) .EQ. D.D) GO TO 415
      FAC(I) = VLBF(I) / VLBF(MNK)
      STOAC(I) = AREA(KAK,I) * FAC(I)
      SSTAC = SSTAC + STDAC(I)
      IF(FAC(I) .EQ. D.0) GO TO 415
      EQIV(I) = 1.0 / FAC(I)
  415 IF(VLCU(MNK) .EQ. D.0) GO TO 420
      FACCF(I) = VLCU(I) / VLCU(MNK)
      STACF(I) = AREA(KAK,I) * FACCF(I)
      SACCF = SACCF + STACF(I)
      IF(FACCF(I) .EQ. 0.0) GO TO 42D
      EQVCF(I) = 1.0 / FACCF(I)
  420 CONTINUE
C
C PRINT PAGE TYPE 11 - GROWING STOCK GOALS BY WORKING GROUP ANO SITE.
C
      WRITE (6,5DD)
  5D0 FORMAT (1H1,///,61X,12HPAGE TYPE 11)
      WRITE (6,502)
  502 FORMAT (1HD,//,47X,38HGROWING STOCK GOALS FOR WORKING CIRCLE)
      WRITE (6,110) (WGPNM(KAK,J),J=1,3)
      WRITE (6,504) (FORET(I), I=1,19)
  5D4 FORMAT (1H ,30X,18A4,A2,////)
      WRITE (6,5D6)
  506 FORMAT (1H0,45X,8HROTATION,11X,10HCU. FT. TO,13X,10HCU. FT. TO,10X
     1,15HM BD. FT. ABOVE)
      WRITE (6,5D8)
  5D8 FORMAT I1H ,1DX,10HSITE CLASS,10X,5HACRES,12X,3HAGE,13X,13HBD. FT.
     1 LIMIT,1DX,12HROTATION AGE,10X,13HBO. FT. LIMIT,///)
      DO 512 I=KSI,KND
      WRITE (6,51D) QUAL(I),AREA(KAK,I),REGN(KAK,1,I),SUBCF(KAK,I),ALLCF
     1(KAK,I),SUBBF(KAK,I)
  510 FORMAT (1H0,11X,F5.0,12X,F9.1,10X,F4.0,12X,F12.0,10X,F12.0,8X,F14.
     10)
  512 CONTINUE
      WRITE (6,514) SARSP(KAK),GVLCU(KAK),SUMCF(KAK),GVLBF(KAK)
  514 FORMAT (1H0,12X,6HTOTALS,9X,F10.1,25X,F13.0,9X,F13.0,7X,F15.D)
      WRITE (6,516)
  516 FORMAT (1H0,//,13X,1D1HCUBIC FEET IN HUNDREOS. TOTAL AREA INCLUOES
     1 ANY LOW SITE ACRES INCORRECTLY CLASSED AS OPERABLE TYPES.)
C
C PRINT PAGE TYPE 12 - STANDARD ACRES AND EOUIVALENT AREAS.
C
      WRITE (6,55D)
  55D FORMAT (1H1,//,60X,12HPAGE TYPE 12)
      WRITE (6,552)
  552 FORMAT (1H0,/,47X,37HCONVERSION OF AREAS TO STANDARO ACRES)
      WRITE (6,11D) (WGPNM(KAK,J),J=1,3)
      WRITE (6,504) (FORET(I), I=1,19)
      WRITE (6,554)
  554 FORMAT (1H0,9X,4HSITE,13X,11HTOTAL YIELD,13X,5HACRES,34X,7HAREA IN
     1,13X,13HEQUIVALENT OF)
      WRITE (6,556)
  556 FORMAT (1H ,9X,5HINOEX,13X,8HPER ACRE,14X,7HIN SITE,12X,9HREDUCTIO
     1N,12X,8HSTANDARD,12X,13HSTANDARO ACRE)
      WRITE (6,558)
  558 FORMAT (1H ,9X,5HCLASS,13X,9HM BO. FT.,14X,5HCLASS,14X,6HFACTOR,15
     1X,5HACRES,14X,13HIN SITE ACRES,//)
      DO 562 I=KSI,KND
      WRITE (6,560) OUAL(I),VLBF(I),AREA(KAK,I),FAC(I),STOAC(I),EQIV(I)
  560 FORMAT(1HD,8X,F5.0,12X,F9.1,12X,F10.1,11X,F9.5,11X,F1D.1,13X,F9.5)
  562 CONTINUE
      WRITE (6,564)
  564 FORMAT (1HD,////)
      WRITE (6,554)
      WRITE (6,556)
      WRITE (6,566)
  566 FORMAT (1H ,9X,5HCLASS,14X,7HCU. FT.,15X,5HCLASS,14X,6HFACTOR,15X,
     15HACRES,14X,13HIN SITF ACRES,//)
      DO 568 I=KSI,KNO
      WRITE (6,56D) OUAL(I),VLCU(I),AREA(KAK,I),FACCF(I),STACF(I),
     1EOVCF(I)
  568 CONTINUE
  600 CONTINUE
      RETURN
      END
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Subroutine YIELD

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      SUBROUTINE YIELD
C
C TO COMPUTE A YIELD TABLE FOR EACH SITE CLASS OF EACH WORKING GROUP.
C
      COMMON ADD,AGE(2),AGEO,BA(2),BAS(2),BASO,BAST,BAUS,BFMRCH,BFVOL,
     1CFVOL,DATE(6),DBH(2),DBHE,DBHO,DBHT,DEN(2),DENO,DENT,DMUS,FBA(2),
     2FCTR(2),FDM(2),FDN(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSO,
     3HTST,KAK,KNO,MIN,MNK,NBK,NCMP,NSJB,NWGP,POBHE,PRET,PROO(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLANO,TBA(2),TDM(2),TEM,TIME,TMBR
     5,TMPO,TOT(2),TOTO,TOTT,TVL(2),VDM(2),VLUS,OMR(2)
      COMMON ABFAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BOMAI(5),BFAGEI5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),DBHTH(5,14),DELAY(5),OENTH(5,14),DLEV(5),FNBD(5),
     4FNCU(5),GROWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),OPBD(5),OPCU(5),PAIBO(5),PAICU(5),POOR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBF(5),SHELT(5,2,14),SHWD(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     BWGNUM(5),WGPOES(5,2D),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),OPEN(7,27),PBRSI(7,14),PDCFN(7,27
     2),POCFR(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLTI
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBD(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      COMMON /BLKA/ ANBOF(151),ANCUV(151),BDFC(15D),BDFO(150),CFMC(150),
     1CFMD(150),CYCL,IROT,KAN,PD1,PD2,QUAL(14),ROTA,VLBF(14),VLCU(14)
C
      COMMON /BLKD/ IJ,IK,KI,VOL,TVOL
C
C INITIALIZE VARIABLES RFCOMPUTED FOR EACH SITE CLASS.
C
      AOOHT = 0.0
      BDFT = 0.0
      CFMT = 0.0
      HTCUM = D.0
      JBDFC = D
      JBDFO = 0
      JBOFT = 0
      JCFMC = 0
      JCFMO = 0
      JCFMT = D
      JSBO = D
      JSMC = D
      JSTF = D
      DO 1D I=1,15D
      BDFC(I) = D.D
      BDFO(I) = 0.0
      CFMC(I) = D.D
   10 CFMD(I) = D.D
      00 15 I=1,151
      ANBOF(I) = 0.0
   15 ANCUV(I) = D.D
      N1 = AGED
      N = AGEO
C
C OBTAIN HTSO AND TOTAL CU. FT. PER ACRE.
C
      BASO = OENO * 0.0054542 * DBHO * DBHO
      IJ = 9
      CALL WORKGP
C
C CONVERT TOTAL CU. FT. TO OTHER UNITS.
C
      IF(DBHO .LE. 4.99) GO TO 25
      KNO = 1
      BA(1) = BASO
      VDM(1) = DBHO
      IJ = 2
      CALL WORKGP
      BDFO(N) = TOTO * PROD(1)
      CFMO(N) = TOTO * FCTR(1)
   25 REST = THIN(KAK)
C
C ENTER LOOP FOR ALL REMAINING COMPUTATIONS AND PRINTOUT.
C
      DO 2DD I=1,1DD
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C
C  CHANGE STANDARDS IF A REGENERATION CUT IS DUE.
C
   30 IF(AGEO .GE. ROTA) GO TO 60
      IF(AGEO .LT. REGN(KAK,1,KAN)) GO TO 50
      IF(AGEO .NE. REGN(KAK,1,KAN)) GO TO 35
      DLEV(KAK) = DLEV(KAK) * VLLV(KAK,1,KAN)
      REST = DLEV(KAK)
      CYCL = INVL(KAK,1,KAN)
      GO TO 50
   35 IF(AGEO .NE. REGN(KAK,2,KAN)) GO TO 40
      DLEV(KAK)= DLEV(KAK) * VLLV(KAK,2,KAN)
      REST = DLEV(KAK)
      CYCL = INVL(KAK,2,KAN)
      GO TO 50
   40 IF(AGEO .NE. REGN(KAK,3,KAN)) GO TO 50
      DLEV(KAK) = DLEV(KAK) * VLLV(KAK,3,KAN)
      REST = DLEV(KAK)
      CYCL = INVL(KAK,3,KAN)
C
C INCREASE D.B.H. BY THINNING AND COMPUTE POST-THINNING VALUES.
C
   50 CALL CUTS
      JDENT = (BAST / (0.0054542 * DBHT * DBHT)) + 0.5
      DENT = JDENT
      BAST = 0.0054542 * DBHT * DBHT * DENT
      IF(BAST .LT. BASO) GO TO 55
      BAST = BASO
      HTST = HTSO
      DENT = DENO
      JDENT = DENO + 0.5
      DBHT = DBHO
      TOTT = TOTO
      BDFT = BDFO(N)
      CFMT = CFMO(N)
      GO TO 60
   55 IJ = 10
      CALL WORKGP
C
C CONVERT TOTAL CU. FT. TO OTHER UNITS.
C
      IF(DBHT .LE. 4.99) GO TO 60
      KNO = 1
      BA(1) = BAST
      VOM(1) = DBHT
      IJ = 2
      CALL WORKGP
      BDFT = TOTT * PROD(1)
      CFMT = TOTT * FCTR(1)
C
C CHANGE MODE AND ROUND OFF FOR PRINTING.
C
   60 JDENO = DENO + 0.5
      JHTSO = HTSO + 0.5
      JTOTO = TOTO + 0.5
      JBASO = BASO + 0.5
      JCFMO = CFMO(N) + 0.5
      JBDFO = BDFO(N) * 0.1 + 0.5
      JBDFO = JBDFO * 10
      JDENT = DENT + 0.5
      JHTST = HTST + 0.5
      JTOTT = TOTT + 0.5
      JDENC = JDENO - JDENT
      JCFMT = CFMT + 0.5
      CFMT = JCFMT
      IF(JCFMT .GT. JCFMO) JCFMO = JCFMT
      CFMO(N) = JCFMO
      JBDFT = BDFT * 0.1 + 0.5
      JBDFT = JBDFT * 10
      BDFT = JBDFT
      BDFT = BDFT * 0.001
      IF(JBDFT .GT. JBDFO) JBDFO = JBDFT
      BDFO(N) = JBDFO
      BDFO(N) = BDFO(N) * 0.001
      JBAST = BAST + 0.5
      JBASC = JBASO - JBAST
      JTOTC = JTOTO - JTOTT
      JCFMC = JCFMO - JCFMT
      IF(JCFMC .LE. 0) JCFMC = 0
      CFMC(N) = JCFMC
      JBDFC = JBDFO - JBDFT
      IF(JBDFC .LE. 0) JBDFC = 0
      BDFC(N) = JBDFC
      BDFC(N) = BDFC(N) * 0.001
C
C  SUM PERIODIC CUTS FOR LAST LINE OF YIELD TABLE.
C
      IF(AGEO .GE. ROTA) GO TO 70
      JSTF = JSTF + JTOTC
      CCFMC = CFMC(N) * 0.01
      IF(CCFMC .LT. COMCU(KAK)) GO TO 65
      JSMC = JSMC + JCFMC
   65 IF(BDFC(N) .LT. COMBF(KAK)) GO TO 70
      JSBD = JSBD + JBDFC
C
C PRINT PAGE TYPE B - YIELD TABLE FOR EACH WORKING GROUP AND SITE.
C
   70 IF(I .GE. 2) GO TO 135
C
C WRITE HEADINGS FOR YIELD TABLE.
C
      WRITE (6,100)
  100 FORMAT (1H1,//,62X,11HPAGE TYPE B)
      WRITE (6,105) QUAL(KAN),CUCY(KAK),THIN(KAK),DLEV(KAK)
  105 FORMAT (1H0, /,28X,81HYIELDS PER ACRE OF MANAGED, EVEN-AGED STANDS
     1 BASED ON PREDETERMINED STANDARDS FOR/1H ,47X,10HSITE INDEX,F5.0,1
     2H,,F5.0,19H-YEAR CUTTING CYCLE/1H ,41X,26HTHINNING LEVELS= INITIAL
     3 -,F6.0,14H, SUBSEQUENT -,F6.0)
      WRITE (6,110) (WGPNM(KAK,J),J=1,3)
  110 FORMAT (1H0,53X,16HWORKING GROUP - ,3A4,/)
      WRITE (6,115)
  115 FORMAT (1H0,25X,38HENTIRE STAND BEFORE AND AFTER THINNING,28X,26HP
     1ERIODIC CUT AND MORTALITY)
      WRITE (6,120)
  120 FORMAT (1H0,9X,5HSTAND,10X,5HBASAL,3X,7HAVERAGE,2X,7HAVERAGE,3X,5H
     1TOTAL,3X,9HMERCHANT-,3X,9HSAWTIMBER,9X,5HBASAL,4X,5HTOTAL,3X,9HMER
     2CHANT-,3X,9HSAWTIMBER)
      WRITE (6,125)
  125 FORMAT (1H ,10X,3HAGE,4X,5HTREES,3X,4HAREA,4X,6HD.B.H.,3X,6HHEIGHT
     1,2X,6HVOLUME,2X,11HABLE VOLUME,4X,6HVOLUME,3X,5HTREES,3X,4HAREA,3X
     2,6HVOLUME,2X,11HABLE VOLUME,4X,6HVOLUME)
      WRITE (6,130)
  130 FORMAT (1H ,8X,7H(YEARS),3X,3HNO.,2X,7HSQ. FT.,4X,3HIN.,6X,3HFT.,4
     1X,7HCU. FT.,3X,7HCU. FT.,4X,9HM BD. FT.,3X,3HNO.,2X,7HSQ. FT.,2X,7
     2HCU. FT.,3X,7HCU. FT.,4X,9HM BD. FT.)
  135 WRITE (6,140) AGEO,JDENO,JBASO,DBHO,JHTSO,JTOTO,CFMO(N),BDFO(N)
  140 FORMAT (1H0,9X,F4.0,4X,I5,2X,I4,5X,F5.1,5X,I3,4X,I5,5X,F6.0,6X,F6.
     13)
      IF(AGEO .GE. ROTA) GO TO 220
      WRITE (6,145) AGEO,JDENT,JBAST,DBHT,JHTST,JTOTT,CFMT,BDFT,JDENC,JB
     1ASC,JTOTC,CFMC(N),BDFC(N)
  145 FORMAT (1H ,9X,F4.0,4X,I5,2X,I4,5X,F5.1,5X,I3,4X,I5,5X,F6.0,6X,F6.
     13,4X,I5,3X,I3,5X,I4,5X,F5.0,7X,F6.3)
C
C COMPUTE VALUES FOR EACH PERIOD. THIN AS SPECIFIED.
C
      KK = CYCL / RINT(KAK)
      DO 190 L=1,KK
      AGEO = AGEO + RINT(KAK)
      N = AGEO
      IF(AGEO .GT. ROTA) GO TO 220
      IJ = 11
      CALL WORKGP
      MNK = DBHO * 10.0 + 0.5
      DBHO = MNK
      DBHO = DBHO * 0.1
C
C REDUCE FUTURE DENSITY BY AMOUNT OF PREDICTED MORTALITY.
C
      IF(DBHT .GE. 10.0) GO TO 170
      IJ = 12
      CALL WORKGP
      IF(DENO .LT. 0.0) DENO = 0.0
      MNK = DENT * (1.0 - DENO) + 0.5
      DENO = MNK
      GO TO 175
  170 DENO = DENT
  175 BASO = DENO * 0.0054542 * DBHO * DBHO
C
C COMPUTE HTSO FROM AGE AND SITE INDEX.
C
      IJ = 9
      CALL WORKGP
C
C CONVERT TOTAL CU. FT. TO OTHER UNITS.
C
      IF(DBHO .LE. 4.99) GO TO 185
      KNO = 1
      BA(1) = BASO
      VOM(1) = DBHO
      IJ = 2
      CALL WORKGP
      BDFO(N) = TOTO * PROD(1)
      CFMO(N) = TOTO * FCTR(1)
C
C  TEST IF REGENERATION CUT IS DUE.
C
      DO 180 KU=1,3
      IF(AGEO .EQ. REGN(KAK,KU,KAN)) GO TO 30
  180 CONTINUE
  185 IF(L .EQ. KK) GO TO 195
C
C WRITE VALUES FOR END OF PERIOD IF THINNING NOT DUE.
C
      JDENO = DENO + 0.5
      JHTSO = HTSO + 0.5
      JBASO = BASO + 0.5
      JTOTO = TOTO + 0.5
      JCFMO = CFMO(N) + 0.5
      CFMO(N) = JCFMO
      JBDFO = BDFO(N) * 0.1 + 0.5
      JBDFO = JBDFO * 10
      BDFO(N) = JBDFO
      BDFO(N) = BDFO(N) * 0.001
      WRITE (6,140) AGEO,JDENO,JBASO,DBHO,JHTSO,JTOTO,CFMO(N),BDFO(N)
      DBHT = DBHO
      BAST = BASO
      DENT = DENO
  190 CONTINUE
  195 REST = DLEV(KAK)
  200 CONTINUE
C
C  ADD FINAL CUTS TO TOTAL YIELDS AND WRITE TOTAL YIELDS.
C
  220 JSTF = JSTF + JTOTO
      CCFMO = JCFMO
      IF(CCFMO .LT. COMCU(KAK)) GO TO 225
      SSMC = JSMC + JCFMO
  225 BBDFO = JBDFO
      IF(BBDFO .LT. COMBF(KAK)) GO TO 230
      SBD = JSBD + JBDFO
      SBD = SBD * 0.001
  230 VLBF(KAN) = SBD
      VLCU(KAN) = SSMC
      WRITE (6,235) JSTF,SSMC,SBD
  235 FORMAT (1H0,67X,12HTOTAL YIELDS,18X,I5,4X,F6.0,7X,F6.3)
      TEM = COMCU(KAK) * 100.0
      TMPY = COMBF(KAK) * 1000.0
```

```
      WRITE (6,240) TEM,TMPY
  240 FORMAT (1HO,/,11K,44HMINIMJM CUTS FJR INCLUSION IN TJTAL Y(ELOS--
     I,F6.0,I5H CUBIC FEET ANO,F7.0,11H BOARD FEET)
      IROT = ROTA
      MNK = RINT(KAK)
      NVOL = ((IRDT - NI)/MNK) + I
      K = NVOL - 1
C
C INTERPOLATE BETWEEN VALUES FROM YIELO TABLE.
C
      OD 260 L=1,K
      DO 260 J=1,MNK
      NN = J + N1 + (L - 1) * MNK
      TEM = J - 1
      N = N1 + (L - 1) * MNK
      ANCUV(NN) = CFMO(N) - CFMC(N) + (TEM / RINT(KAK)) * (CFMO(N+MNK) -
     1 CFMO(N) + CFMC(N))
      ANBOF(NN) = BOFD(N) - BOFC(N) + (TEM / RINT(KAK)) * (BDFO(N+MNK) -
     1 BOFD(N) + BDFC(N))
  260 CONTINUE
C
C STORE VDLUMES ANO GRDWTH RATE OF SHELTERWOOD, IF ANY.
C
      IF(REGN(KAK,2,KAN) .EQ. 0.0) GO TO 335
      KX = REGN(KAK,1,KAN)
      MK = REGN(KAK,2,KAN)
      LX = REGN(KAK,3,KAN)
      SHWO(KAK,1,KAN) = CFMO(KK) - CFMC(KK)
      IF(SHWO(KAK,1,KAN) .LE. 0.0) GO TD 300
      GROWC(KAK,1,KAN) = CFMD(MX) / SHWD(KAK,1,KAN)
      GROWC(KAK,1,KAN) = (GROWC(KAK,1,KAN) - 1.0) / PO1
      GO TO 305
  30D SHWO(KAK,1.KAN) = 0.0
      GROWC(KAK,1,KAN) = 0.0
  305 SHELT(KAK,1,KAN) = BDFO(KX) - BDFC(KX)
      IF(SHELT(KAK,1,KAN) .LE. 0.0) GO TO 310
      GROWB(KAK,1,KAN) = BOFD(MX) / SHELT(KAK,1,KAN)
      GROWB(KAK,1,KAN) = (GRDWB(KAK,1,KAN) - 1.0) / PD1
      GD TD 315
  310 SHELT(KAK,1,KAN) = 0.D
      GROWB(KAK,1,KAN) = 0.D
  315 IF(REGN(KAK,3,KAN) .EO. 0.0) GD TO 335
      SHWO(KAK,2,KAN) = CFMD(MX) - CFMC(MK)
      IF(SHWO(KAK,2,KAN) .LE. 0.0) GO TD 320
      GROWC(KAK,2,KAN) = CFMO(LX) / SHWO(KAK,2,KAN)
      GROWC(KAK,2,KAN) = (GROWC(KAK,2,KAN) - 1.0) / PO2
      GO TO 325
  32D SHWO(KAK,2,KAN) = D.D
      GROWC(KAK,2,KAN) = 0.D
  325 SHELT(KAK,2,KAN) = BOFD(MX) - BDFC(MK)
      IF(SHELT(KAK,2,KAN) .LE. 0.D) GD TO 330
      GROWB(KAK,2,KAN) = BDFD(LK) / SHELT(KAK,2,KAN)
      GROWB(KAK,2,KAN) = (GRDWB(KAK,2,KAN) - 1.D) / PD2
      GO TD 335
  330 SHELT(KAK,2,KAN) = 0.0
      GRDWB(KAK,2,KAN) = D.D
  335 RETURN
      ENO
```

Subroutine CUTS

```
      SUBROUTINE CUTS
C
C TO ESTIMATE INCREASE IN AVERAGE D.B.H. DUE TO THINNING.
C
      COMMON ADD,AGE(2),AGEO,BA(2),BAS(2),BASO,BAST,BAUS,BFMRCH,BFVOL,
     1CFVOL,DATE(6),OBH(2),D8HE,OBHO,OBHT,DEN(2),DENO,DENT,DMUS,FBA(2),
     2FCTR(2),FDM(2),FDN(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSO,
     3HTST,KAK,KND,MIN,MNK,NBK,NCMP,NSUB,NWGP,PDBHE,PRET,PROD(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLAND,TBA(2),TDM(2),TEM,TIME,TMBR
     5,TMPO,TDT(2),TDTO,TOTT,TVL(2),VDM(2),VLUS,DMR(2)
      COMMON ABFAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BDMAI(5),BFAGE(5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),DBHTH(5,14),OELAY(5),DENTH(5,14),DLEV(5),FNBD(5),
     4FNCU(5),GRDWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),OPBO(5),DPCU(5),PAIBD(5),PAICU(5),POOR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBF(5),SHELT(5,2,14),SHWD(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     BWGNUM(5),WGPDES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      CDMMON ACBAR(7),AR8K(7),BARSI(7,14),8FTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),DPEN(7,27),PBRSI(7,14),PDCFN(7,27
     2),PDCFR(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLT(
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBD(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      CDMMON /BLKA/ ANBDF(151),ANCUV(151),BOFC(15D),BDFO(150),CFMC(15D),
     1CFMO(150),CYCL,IRDT,KAN,PD1,PO2,OUAL(14),RDTA,VLBF(14),VLCU(14)
C
      CDMMON /BLKD/ IJ,IK,KI,VOL,TVOL
C
      IF(D8HD .LT. 9.4) GO TO 20
C
C COMPUTE O.B.H. IF OBHO IS LARGE ENOUGH FDR BASAL AREA TO REMAIN
C CDNSTANT.
C
      PRET = 1DD.D
      OO 15 KJ=1,100
      IJ = 5
      CALL WORKGP
      IDBHE = OBHE * 10.0 + 0.5
      DBHE = IOBHE
      OBHE = OBHE * 0.1
      OENE = DEND * PRET * D.01
      NOENE = DENE + D.5
      DENE = NDENE
      BASE = 0.0D54542 * DBHE * OBHE * DENE
      NBASE = BASE * 10.0 + 0.5
      BASE = NBASE
      BASE = BASE * 0.1
      TMPY = 0.0054542 * OBHF * O8HE
      TEM = BASE - REST
      IF(TEM .LE. TMPY) GD TO 60
      IF(TEM .LT. 4.0) GD TO 10
      PRET = PRET - 1.0
      GD TO 15
   10 PRET = PRET - 0.3
   15 CDNTINUE
      GO TO 60
C
C CDMPUTE O.B.H. IF BASAL AREA INCREASES WITH O.B.H.
C
   20 PRET = 40.0
      IF(OBHO .GT. 7.0) PRET = 70.0
      DO 55 J=1,1DO
      IJ = 5
      CALL WORKGP
      IDBHE = DBHE * 10.0 + 0.5
      DBHE = IOBHE
      OBHE = OBHE * 0.1
      OENE = OENO * (PRET * 0.01)
      NDENE = OENE + 0.5
      OENE = NOENE
      BASE = 0.0054542 * DBHE * ORHE * DENE
      NBASE = BASE * 10.0 + 0.5
      8ASE = NBASE
      BASE = BASE * 0.1
      BREAK = 49.9 * REST / BO.0
      IF(BASE .GT. BREAK) GD TO 30
      OBHP = (BO.0 / REST) * (0.0B6B2 * BASE) + 0.94636
      GD TO 40
   30 BUST = 66.2 * (REST / 80.0)
      IF(BASE .GT. BUST) GO TO 35
      DBHP = (B0.0 / REST) * (0.10938 * BASE) - 0.1785B
      GO TO 40
   35 TMPY = BASE * (B0.0 / REST)
      TEM = TMPY * TMPY
      OBHP = 19.04740 * TMPY - 0.26673 * TEM + 0.0012539 * TEM * TMPY
     1 - 44B.76B33
      IF(TMPY .GT. BO.0) OBHP = OBHO + 0.B
   40 IOBHP = DBHP * 10.0 + 0.5
      OBHP = IDBHP
      OBHP = DBHP * 0.1
      IF(OBHP - DBHE) 45,60,50
   45 PRET = PRET * 1.02
      GO TO 55
   50 PRET = PRET * 0.98
   55 CONTINUE
   6D DBHT = DBHE
C
C COMPUTE POST-THINNING BASAL AREA.
C
      IF(D8HT .GT. 5.0) GO TO 65
      SQFT = 11.5B495 * DBHT - 11.09724
      GD TD 7D
   65 IF(OBHT .GE. 10.0) GD TO 75
      TEM = DBHT * DBHT
      SOFT = 7.76226 * OBHT +0.85289 * TEM -D.07952 * TEM * DBHT-3.45624
   7D BAST = (REST / BD.0) * SOFT
      GD TO 80
   75 8AST = REST
   80 RETURN
      END
```

Subroutine WORKGP

```
      SUBROUTINE WORKGP
C
C TO CALL SUBRDUTINES CONTAINING SPECIES - SPECIFIC STATEMENTS.
C
      COMMON AOD,AGE(2),AGED,BA(2),BAS(2),BASO,BAST,8AUS,BFMRCH,BFVDL,
     1CFVOL,DATE(6),D8H(2),DBHE,OBHO,DBHT,DEN(2),DENO,OENT,OMUS,FBA(2),
     2FCTR(2),FDM(2),FDN(2),FHT(2),FDRET(19),FVL(2),HT(2),HTCUM,HTSO,
     3HTST,KAK,KNO,MIN,MNK,NBK,NCMP,NSJB,NWGP,PDBHE,PRET,PROD(2),REST,
     4SAVE,SBARB,S8ARE,SBARG,SBAS,SITE,SLAND,TBA(2),TDM(2),TEM,TIME,TMBR
     5,TMPO,TOT(2),TOTO,TDTT,TVL(2),VDM(2),VLUS,DMR(2)
      COMMON ABFAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BDMAI(5),BFAGE(5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),CDMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),DBHTH(5,14),OELAY(5),OENTH(5,14),DLEV(5),FNBD(5),
     4FNCU(5),GROWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),OPBD(5),OPCU(5),PAIBD(5),PAICU(5),POOR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),S8F(5),SHELT(5,2,14),SHWD(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     8WGNUM(5),WGPDES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      CDMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),DPEN(7,27),PBRSI(7,14),PDCFN(7,27
     2),PDCFR(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLT(
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBO(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      COMMON /BLKO/ IJ,IK,KI,VOL,TVOL
C
C EKPAND FOLLOWING GO TD AS NEEDED FOR ADDITIONAL SPECIES.
C
      NKAK = SPNUM(KAK)
      GO TD (1,2,3,4,5), NKAK
    1 CALL BHPP
      RETURN
    2 CALL LDGP
      RETURN
    3 CALL SWPP
      RETURN
C
C CONTINUE CALLS TD SUBRDUTINES TO MATCH LENGTH OF GO TO.
C
    4 CONTINUE
      RETURN
    5 CONTINUE
      RETURN
      END
```

Subroutine GOT

```
      SUBROUTINE GOT
C
C TO COMPUTE PRESENT VOLUMES, DISTRIBUTIONS OF AREA AND VOLUME, AND
C POTENTIAL GROWTH FROM INVENTORY DATA.
C
      COMMON ADO,AGE(2),AGEO,BA(2),BAS(2),BASO,BAST,BAUS,BFMRCH,BFVOL,
     1CFVOL,DATE(6),DBH(2),DBHE,DBHD,DBHT,DEN(2),DENO,DENT,DMUS,FBA(2),
     2FCTR(2),FOM(2),FON(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSO,
     3HTST,KAK,KND,MIN,MNK,NBK,NCMP,NSUB,NWGP,PDBHE,PRET,PROD(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLAND,TBA(2),TOM(2),TEM,TIME,TMBR
     5,TMPD,TOT(2),TOTD,TOTT,TVL(2),VOM(2),VLUS,OMR(2)
      COMMON ABFAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BOMAI(5),BFAGE(5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),DBHTH(5,14),DELAY(5),DENTH(5,14),DLEV(5),FNBO(5),
     4FNCU(5),GROWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),DPBO(5),OPCU(5),PAIBO(5),PAICU(5),POOR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBF(5),SHELT(5,2,14),SHWD(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     BWGNUM(5),WGPOES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),OPEN(7,27),PBRSI(7,14),POCFN(7,27
     2),POCFR(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLT(
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBO(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      COMMON /OPT/ OPTION,ICT9
C
      COMMON /BLKA/ ANBOF(151),ANCUV(151),BDFC(150),BOFO(150),CFMC(150),
     1CFMO(150),CYCL,IROT,KAN,PD1,PD2,QUAL(14),ROTA,VLBF(14),VLCU(14)
C
      COMMON /BLKB/ PAFN(5,7,15),PARG(5,7,15),
     1PBFT(7,27),PCMT(7,27),PCTA(7,27),PCTB(7,27),PGBO(5,7,15),PGMC(5,7,
     215),PHLP(7,27),POPN(7,27),PPBF(5,7,15),PPCR(7,27),PPFN(7,27),
     3PPMC(5,7,15),PPTC(5,7,15),PSLV(7,27),PTBF(5,7,15),PTCU(5,7,15),
     4PTMC(5,7,15)
C
      COMMON /BLKD/ IJ,IK,KI,VOL,TVOL
C
      DIMENSION FBD(2),FMC(2),BFM(2),CM(2),TBD(2),TCM(2)
C
C INITIALIZE VARIABLES FIRST DEFINED IN THIS SUBROUTINE.
C
      DO 2 I=1,NWGP
      DO 2 J=1,NBK
      DO 2 K=1,15
      PAFN(I,J,K) = 0.0
      PARG(I,J,K) = 0.0
      PGBD(I,J,K) = 0.0
      PGMC(I,J,K) = 0.0
      PPBF(I,J,K) = 0.0
      PPMC(I,J,K) = 0.0
      PPTC(I,J,K) = 0.0
      PTBF(I,J,K) = 0.0
      PTCU(I,J,K) = 0.0
      PTMC(I,J,K) = 0.0
    2 CONTINUE
      DO 4 I=1,NBK
      DO 4 J=1,27
      PBFT(I,J) = 0.0
      PCMT(I,J) = 0.0
      PCTA(I,J) = 0.0
      PCTB(I,J) = 0.0
      PHLP(I,J) = 0.0
      POPN(I,J) = 0.0
      PPCR(I,J) = 0.0
      PPFN(I,J) = 0.0
      PSLV(I,J) = 0.0
    4 CONTINUE
C
C INITIALIZE VARIABLES RECOMPUTED FOR EACH INVENTORY RECORD.
C
   10 DO 15 I=1,2
      BAS(I) = 0.0
      BFM(I) = 0.0
      CM(I) = 0.0
      FBA(I) = 0.0
      FBD(I) = 0.0
      FOM(I) = 0.0
      FON(I) = 0.0
      FHT(I) = 0.0
      FMC(I) = 0.0
      FVL(I) = 0.0
      TBA(I) = 0.0
      TBD(I) = 0.0
      TCM(I) = 0.0
      TOM(I) = 0.0
      TVL(I) = 0.0
   15 TOT(I) = 0.0
      BAUS = 0.0
      BDUS = 0.0
      BFVOL = 0.0
      CFVOL = 0.0
      CMUS = 0.0
      DMUS = 0.0
      ONUS = 0.0
      FTBD = 0.0
      FTCM = 0.0
      HTUS = 0.0
      STOR1 = 0.0
      STOR2 = 0.0
      TEM = MIN
      TMBD = 0.0
      TMCF = 0.0
      VLUS = 0.0
C
C READ INVENTORY DATA, ONE RECORD AT A TIME FROM CARD TYPE 9. LAST
C RECORD IS CARD TYPE 10 WITH IBK = 99 TO STOP PROCESSING.
C
      READ (ICT9,20) IBK,KOMP,ISUB,QTR1,QTR2,SECT,TOWN,RANG,SITE,STRY,
     1NTYP,WORK,FISC,DBH(1),HT(1),DEN(1),AGE(1),OMR(1),DBH(2),HT(2),DEN(
     22),AGE(2),OMR(2),ACRE,WHEN
   20 FORMAT (I2,I4,I3,3A3,2A4,F3.0,F1.0,I2,F1.0,F4.0,F3.1,F3.0,F5.0,F3.
     10,F2.1,F3.1,F3.0,F5.0,F3.0,F2.1,F5.1,F4.0)
C
C STOP VOLUME COMPUTATIONS IF ALL INVENTORY RECORDS READ.
C
      IF (IBK .EQ. 99) GO TO 400
C
C CONTINUE COMPUTATIONS IF ALL RECORDS NOT READ.
C
      IF (NTYP .GT. 25) GO TO 10
      KAN = (SITE + 4.5) * 0.1
      STOR1 = HT(1)
      STOR2 = HT(2)
      JS = (AGE(1) + 9.5) * 0.1
      IF(STRY .GT. 0.0) JS = (AGE(2) + 9.5) * 0.1
      IF(JS .GT. 15) JS = 15
      IF(NTYP .GT. 0 .AND. NTYP .LT. 6) KAK = 1
      IF(NTYP .GT. 5 .AND. NTYP .LT. 11) KAK = 2
      IF (NTYP .GT. 10 .AND. NTYP .LT. 16) KAK = 3
      IF (NTYP .GT. 15 .AND. NTYP .LT. 21) KAK = 4
      IF (NTYP .GT. 20 .AND. NTYP .LT. 26) KAK = 5
      IF(SITE .LT. POOR(KAK)) GO TO 10
      IF(DBH(1) .GT. 0.0) GO TO 35
C
C TEST FOR NONCOMMERCIAL THINNING IN VERY YOUNG STANDS.
C
      IF(WORK .NE. 2.0) GO TO 10
      IF(ACRE .EQ. 0.0) GO TO 30
      HELP(IBK,NTYP) = HELP(IBK,NTYP) + ACRE
      GO TO 10
   30 PHLP(IBK,NTYP) = PHLP(IBK,NTYP) + 1.0
      GO TO 10
C
C COMPUTE BASAL AREAS AND VOLUMES PER ACRE.
C
   35 DO 40 I=1,2
      BAS(I) = 0.0054542 * DBH(I) * DBH(I) * DEN(I)
      IF(DBH(I) .LT. 3.0) GO TO 40
      IF(AGE(I) .LT. TEM) GO TO 40
      IJ = 1
      IK = I
      CALL WORKGP
   40 CONTINUE
C
C IF WORK CODED FOR THINNING, VERIFY THAT IT CAN BE DONE.
C
      IF(WORK .EQ. 2.0) GO TO 50
      IF(WORK .EQ. 6.0) GO TO 55
      GO TO 90
   50 K = 1
      GO TO 60
   55 K = 2
   60 IF(DBH(K) .LT. 2.0) GO TO 90
      IF(DBH(K) .GT. 5.0) GO TO 65
      LEVL = 80.0 * BAS(K) / (11.58495 * DBH(K) - 11.09724)
      TMPY = THIN(KAK)
      GO TO 80
   65 IF(DBH(K) .GE. 10.0) GO TO 70
      TEM = DBH(K) * DBH(K)
      LEVL = 80.0 * BAS(K) / (7.76226 * DBH(K) + 0.85289 * TEM - 0.07952
     1* TEM * DBH(K) - 3.45624)
      GO TO 75
   70 LEVL = BAS(K)
   75 TMPY = DLEV(KAK)
   80 IF(WORK .EQ. 6.0) GO TO 85
      IF(LEVL .LE. TMPY) WORK = 0.0
      GO TO 90
   85 IF(LEVL .LE. TMPY) WORK = 5.0
   90 IF(TOT(1) .EQ. 0.0) GO TO 120
C
C CONVERT TOTAL CU. FT. TO OTHER UNITS.
C
      IF(DBH(1) .LE. 4.99) GO TO 105
      KND = 2
      BA(1) = BAS(1)
      BA(2) = BAS(2)
      VDM(1) = DBH(1)
      VDM(2) = DBH(2)
      IJ = 2
      CALL WORKGP
      DO 100 I=1,2
      BFM(I) = TOT(I) * PROD(I) * 0.001
  100 CM(I) = TOT(I) * FCTR(I) * 0.01
  105 DO 110 I=1,2
  110 TOT(I) = TOT(I) * 0.01
C
C ADD VOLUMES TO APPROPRIATE TOTALS.
C
      TMCF = CM(1) + CM(2)
      TMBD = BFM(1) + BFM(2)
      IF(ACRE .EQ. 0.0) GO TO 115
      PTCU(KAK,IBK,JS) = PTCU(KAK,IBK,JS) + (TOT(1) + TOT(2)) * ACRE
      PTMC(KAK,IBK,JS) = PTMC(KAK,IBK,JS) + (TMCF * ACRE)
      IF(TMBD .LT. BFMRCH) GO TO 120
      PTBF(KAK,IBK,JS) = PTBF(KAK,IBK,JS) + (TMBD * ACRE)
      GO TO 120
  115 PPTC(KAK,IBK,JS) = PPTC(KAK,IBK,JS) + TOT(1) + TOT(2)
      PPMC(KAK,IBK,JS) = PPMC(KAK,IBK,JS) + TMCF
      IF(TMBD .LT. BFMRCH) GO TO 120
      PPBF(KAK,IBK,JS) = PPBF(KAK,IBK,JS) + TMBD
C
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C COMPUTE GROWTH FOR NEXT PERIOD BY WORKING GROUP, BLOCK, AND AGE CLASS.
C
  120 IF(WORK .NE. 3.0) GO TO 130
      IF(BFM(1) .LT. COMBF(KAK)) GO TO 10
      IF(ACRE .EQ. 0.0) GO TO 125
      SLVG(IBK,NTYP) = SLVG(IBK,NTYP) + (BFM(I) * ACRE)
      GO TO 10
  125 PSLV(IBK,NTYP) = PSLV(IBK,NTYP) + BFM(1)
      GO TO 10
  130 TMOY = AGE(1) + TIME
      TEM = MIN
      IF(TMOY .LT. TEM) GO TO 150
      SBAS = BAS(I) + BAS(2)
      IF(SBAS .EQ. 0.0) GO TO 150
      J = TIME / RINT(KAK)
      DO 140 K=1,J
      IJ = 3
      CALL WORKGP
      IF(J .EO. 1) GO TO 140
      DO 135 I=1,2
      AGE(I) = AGE(I) + RINT(KAK)
      DBH(I) = FDM(I)
      DEN(I) = FDN(I)
      HT(I) = FHT(I)
  135 CONTINUE
      SBAS = FBA(1) + FBA(2)
  140 CONTINUE
C
C CONVERT TOTAL CU. FT. TO OTHER UNITS.
C
      IF(FDM(1) .LE. 4.99) GO TO 150
      KND = 2
      BA(1) = FBA(1)
      BA(2) = FBA(2)
      VDM(1) = FDM(1)
      VDM(2) = FDM(2)
      IJ = 2
      CALL WORKGP
      DO 145 I=1,2
      FBD(I) = FVL(I) * PROD(I) * 0.001
      FMC(I) = FVL(I) * FCTR(I) * 0.01
  145 CONTINUE
C
C ADD PERIODIC GROWTH IF NO WORK IS PLANNED DURING NEXT PERIOD.
C
  150 IF(WORK .GT. 1.0) GO TO 170
      IF(ACRE .EQ. 0.0) GO TO 155
      GRBD(KAK,IBK,JS) = GRBD(KAK,IBK,JS) + (FBD(I)+FBD(2)-TMBD) * ACRE
      GRMC(KAK,IBK,JS) = GRMC(KAK,IBK,JS) + (FMC(1)+FMC(2)-TMCF) * ACRE
      GO TO 10
  155 PGBD(KAK,IBK,JS) = PGBD(KAK,IBK,JS) + FBD(1) + FBD(2) - TMBD
      PGMC(KAK,IBK,JS) = PGMC(KAK,IBK,JS) + FMC(1) + FMC(2) - TMCF
      GO TO 10
C
C COMPUTE FUTURE UNTHINNED UNDERSTORY IF OVERSTORY IS REDUCED NOW.
C
  170 IF(WORK .LT. 4.0) GO TO 175
      IF(WORK .GT. 5.0) GO TO 175
      IF(DBH(2) .EQ. 0.0) GO TO 175
      IJ = 4
      CALL WORKGP
      IF(DMUS .LT. 5.0) GO TO 175
      KND = 1
      BA(1) = BAUS
      VDM(1) = DMUS
      IJ = 2
      CALL WORKGP
      BDUS = VLUS * PROD(1) * 0.001
      CMUS = VLUS * FCTR(1) * 0.01
C
C DETERMINE POTENTIAL WORK LOAD FOR NEXT PERIOD. CREDIT FUTURE CUTS
C WITH HALF PERIODIC GROWTH OBTAINED IF NOT CUT.
C INCLUDE STANDS NEAR ROTATION AGE IN POTENTIAL REGENERATION CUTS
C REGARDLESS OF WORK INDEX.
C
  175 IF(WORK .EQ. 2.0) GO TO 285
      IF(WORK .GT. 4.0) GO TO 245
C
C COMPUTE GROWTH AND YIELD OF STANDS TO BE REGENERATED IN NEXT PERIOD.
C
      IF(AGE(1) .GE. REGN(KAK,2,KAN)) GO TO 180
      TEM = GROWB(KAK,1,KAN) * TIME
      DMY = SHELT(KAK,I,KAN)
      GO TO 185
  180 TEM = GROWB(KAK,2,KAN) * TIME
      DMY = SHELT(KAK,2,KAN)
  185 TMPY = (FBD(1) + BFM(I)) * 0.5
      IF(TMPY .LT. DMY) DMY = TMPY
      IF(ACRE .EQ. 0.0) GO TO 190
      GRBD(KAK,IBK,JS) = GRBD(KAK,IBK,JS) + (FBD(2) + BDUS - BFM(2) - BF
     1M(2) + FBD(1) - BFM(1) + DMY * TEM) * 0.5 * ACRE
      ACRGN(KAK,IBK,JS) = ACRGN(KAK,IBK,JS) + ACRE
      GO TO 195
  190 PGBD(KAK,IBK,JS) = PGBD(KAK,IBK,JS) + (FBD(2) + BDUS - BFM(2) - BF
     1M(2) + FBD(1) - BFM(1) + DMY * TEM) * 0.5
      PARG(KAK,IBK,JS) = PARG(KAK,IBK,JS) + 1.0
  195 IF(AGE(1) .GE. REGN(KAK,2,KAN)) GO TO 200
      TEM = GROWC(KAK,1,KAN) * TIME
      DMY = SHWD(KAK,1,KAN) * 0.01
      GO TO 205
  200 TEM = GROWC(KAK,2,KAN) * TIME
      DMY = SHWD(KAK,2,KAN) * 0.01
  205 TMPY = (FMC(1) + CM(I)) * 0.5
      IF(TMPY .LT. DMY) DMY = TMPY
      IF(ACRE .EQ. 0.0) GO TO 210
      GRMC(KAK,IBK,JS) = GRMC(KAK,IBK,JS) + (FMC(2) + CMUS - CM(2) - CM(
     12) + FMC(1) - CM(1) + DMY * TEM) * 0.5 * ACRE
      GO TO 215
  210 PGMC(KAK,IBK,JS) = PGMC(KAK,IBK,JS) + (FMC(2) + CMUS - CM(2) - CM(
     12) + FMC(I) - CM(I) + DMY * TEM) * 0.5
  215 IF(AGE(1) .GE. REGN(KAK,2,KAN)) GO TO 220
      BFVOL = (BFM(1) + FBD(I)) * 0.5 - SHELT(KAK,1,KAN)
      CFVOL = (CM(I) + FMC(1)) * 0.5 - SHWD(KAK,1,KAN) * 0.01
      GO TO 225
  220 BFVOL = (BFM(I) + FBD(1)) * 0.5 - SHELT(KAK,2,KAN)
      CFVOL = (CM(1) + FMC(1)) * 0.5 - SHWD(KAK,2,KAN) * 0.01
  225 IF(BFVOL .LT. COMBF(KAK)) GO TO 235
      IJ = 6
      KI = 1
      VOL = BFVOL
      TVOL = CFVOL
      CALL WORKGP
      IF(ACRE .EQ. 0.0) GO TO 230
      CUTA(IBK,NTYP) = CUTA(IBK,NTYP) + (BFVOL * ACRE)
      POCFR(IBK,NTYP) = POCFR(IBK,NTYP) + (ADD * ACRE)
      GO TO 10
  230 PCTA(IBK,NTYP) = PCTA(IBK,NTYP) + BFVOL
      PPCR(IBK,NTYP) = PPCR(IBK,NTYP) + ADD
      GO TO 10
  235 IF(CFVOL .LT. COMCU(KAK)) GO TO 10
      IF(ACRE .EQ. 0.0) GO TO 240
      POCFR(IBK,NTYP) = POCFR(IBK,NTYP) + (CFVOL * ACRE)
      GO TO 10
  240 PPCR(IBK,NTYP) = PPCR(IBK,NTYP) + CFVOL
      GO TO 10
C
C COMPUTE GROWTH AND YIELD OF STANDS TO LOSE OVERSTORY IN NEXT PERIOD.
C
  245 IF(ACRE .EQ. 0.0) GO TO 250
      GRBD(KAK,IBK,JS) = GRBD(KAK,IBK,JS)+((FBD(1) - BFM(1)) * 0.5)*ACRE
      GRMC(KAK,IBK,JS) = GRMC(KAK,IBK,JS)+((FMC(1) - CM(1)) * 0.5)*ACRE
      ACFNL(KAK,IBK,JS) = ACFNL(KAK,IBK,JS) + ACRE
      GO TO 255
  250 PGBD(KAK,IBK,JS) = PGBD(KAK,IBK,JS) + (FBD(1) - BFM(1)) * 0.5
      PGMC(KAK,IBK,JS) = PGMC(KAK,IBK,JS) + (FMC(1) - CM(I)) * 0.5
      PAFN(KAK,IBK,JS) = PAFN(KAK,IBK,JS) + 1.0
  255 BFVOL = (BFM(1) + FBD(I)) * 0.5
      CFVOL = (CM(1) + FMC(1)) * 0.5
      IF(BFVOL .LT. COMBF(KAK)) GO TO 265
      IJ = 6
      KI = 1
      VOL = BFVOL
      TVOL = CFVOL
      CALL WORKGP
      IF(ACRE .EQ. 0.0) GO TO 260
      CUTB(IBK,NTYP) = CUTB(IBK,NTYP) + BFVOL * ACRE
      POCFN(IBK,NTYP) = POCFN(IBK,NTYP) + (ADD * ACRE)
      GO TO 275
  260 PCTB(IBK,NTYP) = PCTB(IBK,NTYP) + BFVOL
      PPFN(IBK,NTYP) = PPFN(IBK,NTYP) + ADD
      GO TO 275
  265 IF(CFVOL .LT. COMCU(KAK)) GO TO 275
      IF(ACRE .EQ. 0.0) GO TO 270
      POCFN(IBK,NTYP) = POCFN(IBK,NTYP) + CFVOL * ACRE
      GO TO 275
  270 PPFN(IBK,NTYP) = PPFN(IBK,NTYP) + CFVOL
  275 IF(WORK .GT. 5.0) GO TO 285
      IF(ACRE .EQ. 0.0) GO TO 280
      GRBD(KAK,IBK,JS) = GRBD(KAK,IBK,JS) + (FBD(2) - BFM(2) + BDUS - BF
     1M(2)) * 0.5 * ACRE
      GRMC(KAK,IBK,JS) = GRMC(KAK,IBK,JS) + (FMC(2) - CM(2) + CMUS - CM(
     12)) * 0.5 * ACRE
      GO TO 10
  280 PGBD(KAK,IBK,JS) = PGBD(KAK,IBK,JS) + (FBD(2) - BFM(2) + BDUS - BF
     1M(2)) * 0.5
      PGMC(KAK,IBK,JS) = PGMC(KAK,IBK,JS) + (FMC(2) - CM(2) + CMUS - CM(
     12)) * 0.5
      GO TO 10
  285 HT(1) = STOR1
      HT(2) = STOR2
C
C GET VOLUME IF THINNED NOW AND IF THINNED IN TIME YEARS.
C
      K = 1
      IF(WORK .EQ. 6.0) K = 2
      DO 310 I=1,2
      REST = OLEV(KAK)
      IF(I .EQ. 2) GO TO 300
      IF(DBH(K) .EQ. 0.0) GO TO 310
      IF(DBH(K) .LT. 6.0) REST = THIN(KAK)
      DBHD = DBH(K)
      DEND = DEN(K)
      GO TO 305
  300 IF(FDM(K) .EQ. 0.0) GO TO 310
      IF(FDM(K) .LT. 6.0) REST = THIN(KAK)
      DBHD = FDM(K)
      DEND = FDN(K)
  305 CALL CUTS
      TBA(I) = BAST
      TDM(I) = DBHT
      IF(I .EQ. 1) SAVE = PRET
      IF(I .EQ. 2) HT(K) = FHT(K)
      IJ = 7
      IK = I
      KI = K
      CALL WORKGP
  310 CONTINUE
C
C CONVERT TOTAL CU. FT. TO OTHER UNITS.
C
      IF(TDM(2) .LE. 4.99) GO TO 320
      KND = 2
      BA(1) = TBA(1)
      BA(2) = TBA(2)
      VDM(1) = TDM(1)
      VDM(2) = TDM(2)
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      IJ = 2
      CALL WORKGP
      DO 315 I=1,2
      IF(TVL(I) .EQ. 0.0) GO TO 315
      TBO(I) = TVL(I) * PROD(I) * 0.001
      TCM(I) = TVL(I) * FCTR(I) * 0.01
  315 CONTINUE
C
C GET STATUS AT END OF PERIOD OF A PLOT THINNED AT START OF PERIOD.
C
  320 HT(1) = STOR1
      IF(K .FQ. 2) HT(1) = STOR2
      IJ = 8
      KI = K
      CALL WORKGP
      IF(FOM(1) .LE. 4.99) GO TO 330
C
C CONVERT TOTAL CU. FT. TO OTHER UNITS.
C
      KNO = 1
      BA(1) = FBA(1)
      VOM(1) = FOM(1)
      IJ = 2
      CALL WORKGP
      FTBO = FVL(1) * PROD(1) * 0.001
      FTCM = FVL(1) * FCTR(1) * 0.01
      IF(ACRE .EQ. 0.0) GO TO 325
      GRBO(KAK,IBK,JS) = GRBO(KAK,IBK,JS) + (FBO(K) - BFM(K) + FTBO - TB
     1O(1)) * 0.5 * ACRE
      GRMC(KAK,IBK,JS) = GRMC(KAK,IBK,JS) + (FMC(K) - CM(K) + FTCM - TCM
     1(1)) * 0.5 * ACRE
      GO TO 330
  325 PGBO(KAK,IBK,JS) = PGBO(KAK,IBK,JS) + (FBO(K) - BFM(K) + FTBO - TB
     1O(1)) * 0.5
      PGMC(KAK,IBK,JS) = PGMC(KAK,IBK,JS) + (FMC(K) - CM(K) + FTCM - TCM
     1(1)) * 0.5
C
C ASSIGN THINNINGS TO BO. FT. OR CU. FT. TOTALS, IF COMMERCIAL.
C
  330 THB = (FBO(K) - TBO(2) + BFM(K) - TBO(1)) * 0.5
      THC = (FMC(K) - TCM(2) + CM(K) - TCM(1)) * 0.5
      IF(THB .LT. COMBF(KAK)) GO TO 340
      IJ = 6
      KI = K
      VOL = THB
      TVOL = THC
      CALL WORKGP
      IF(ACRE .FQ. 0.0) GO TO 335
      BFTH(IBK,NTYP) = BFTH(IBK,NTYP) + (THB * ACRE)
      CMTH(IBK,NTYP) = CMTH(IBK,NTYP) + (ADD * ACRE)
      OPEN(IBK,NTYP) = OPEN(IBK,NTYP) + ACRE
      GO TO 10
  335 PBFT(IBK,NTYP) = PBFT(IBK,NTYP) + THB
      PCMT(IBK,NTYP) = PCMT(IBK,NTYP) + ADD
      POPN(IBK,NTYP) = POPN(IBK,NTYP) + 1.0
      GO TO 10
  340 IF(THC .LT. COMCU(KAK)) GO TO 350
      IF(ACRE .EQ. 0.0) GO TO 345
      CMTH(IBK,NTYP) = CMTH(IBK,NTYP) + (THC * ACRE)
      OPEN(IBK,NTYP) = OPEN(IBK,NTYP) + ACRE
      GO TO 10
  345 PCMT(IBK,NTYP) = PCMT(IBK,NTYP) + THC
      POPN(IBK,NTYP) = POPN(IBK,NTYP) + 1.0
      GO TO 10
C
C MAKE RECORD OF NONCOMMERCIAL THINNINGS.
C
  350 IF(ACRE .EQ. 0.0) GO TO 355
      HELP(IBK,NTYP) = HELP(IBK,NTYP) + ACRE
      GO TO 10
  355 PHLP(IBK,NTYP) = PHLP(IBK,NTYP) + 1.0
      GO TO 10
  400 RETURN
      END
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Subroutine SUMS

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      SUBROUTINE SUMS
C
C TO COMPUTE VOLUME AND AREA TOTALS BY WORKING GROUP, AGE CLASS, ETC.
C
      COMMON ADD,AGE(2),AGED,BA(2),BAS(2),BASO,BAST,BAJS,BFMRCH,BFVOL,
     1CFVOL,DATF(6),DBH(2),DBHE,DBHO,DBHT,DEN(2),DENO,DENT,DMUS,FBA(2),
     2FCTR(2),FOM(2),FON(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSO,
     3HTST,KAK,KNO,MIN,MNK,NBK,NCMP,NSUB,NWGP,PDBHE,PRET,PROD(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLAND,TBA(2),TOM(2),TEM,TIME,TMBR
     5,TMPO,TOT(2),TOTD,TOTT,TVL(2),VOM(2),VLUS,OMR(2)
      COMMON ABFAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BOMAI(5),BFAGE(5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),DBHTH(5,14),DELAY(5),DENTH(5,14),DLEV(5),FNBD(5),
     4FNCU(5),GROWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),OPBD(5),OPCU(5),PAIBO(5),PAICU(5),POOR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SPF(5),SHELT(5,2,14),SHWD(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     8WGNUM(5),WGPDES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),OPEN(7,27),PBRSI(7,14),POCFN(7,27
     2),POCFR(7,27),PSPLT(7,27),PUNC(7,27),SAFETY(7,35),SLVG(7,27),SPLT
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBD(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      COMMON /BLKB/ PAFN(5,7,15),PARG(5,7,15),
     1PBFT(7,27),PCMT(7,27),PCTA(7,27),PCTB(7,27),PGBD(5,7,15),PGMC(5,7,
     215),PHLP(7,27),POPN(7,27),PPBF(5,7,15),PPCR(7,27),PPFN(7,27),
     3PPMC(5,7,15),PPTC(5,7,15),PSLV(7,27),PTBF(5,7,15),PTCU(5,7,15),
     4PTMC(5,7,15)
C
      DIMENSION BFBLK(7),BFSP(5,7),BFTB(7,27),CFMER(7),CFTB(7,27),
     1CMSP(5,7),CMTB(7,27),TCF(7),TCSP(5,7),STC(5)
C
C INITIALIZE VARIABLES FIRST DEFINFO IN THIS SUBROUTINE.
C
      SBDF = 0.0
      SCFM = 0.0
      SSPT = 0.0
      STCF = 0.0
      SUNC = 0.0
      DO 1 I=1,NWGP
      STC(I) = 0.0
      DO 1 J=1,NBK
      BFSP(I,J) = 0.0
      CMSP(I,J) = 0.0
      TCSP(I,J) = 0.0
    1 CONTINUE
      DO 4 I=1,NBK
      BFBLK(I) = 0.0
      CFMER(I) = 0.0
      TCF(I) = 0.0
      DO 4 J=1,27
      BFTB(I,J) = 0.0
      CFTB(I,J) = 0.0
      CMTB(I,J) = 0.0
    4 CONTINUE
C
C COMPUTE TOTAL VOLUMES BY WORKING GROUP, BLOCK, AND AGE CLASS.
C
      DO 50 I=1,NWGP
      DO 50 J=1,NBK
      K = 1 + (I - 1) * 5
      IF(PSPLT(J,K) .EQ. 0.0) GO TO 15
      TEM = PARTY(J,K) / PSPLT(J,K)
      DO 10 MNK=1,3
      PGBD(I,J,MNK) = PGBD(I,J,MNK) * TEM
      PGMC(I,J,MNK) = PGMC(I,J,MNK) * TEM
      PPBF(I,J,MNK) = PPBF(I,J,MNK) * TEM
      PPTC(I,J,MNK) = PPTC(I,J,MNK) * TEM
      PPMC(I,J,MNK) = PPMC(I,J,MNK) * TEM
   10 CONTINUE
   15 K = K + 1
      IF(PSPLT(J,K) .EQ. 0.0) GO TO 25
      TEM = PARTY(J,K) / PSPLT(J,K)
      DO 20 MNK=4,5
      PGBD(I,J,MNK) = PGBD(I,J,MNK) * TEM
      PGMC(I,J,MNK) = PGMC(I,J,MNK) * TEM
      PPBF(I,J,MNK) = PPBF(I,J,MNK) * TEM
      PPTC(I,J,MNK) = PPTC(I,J,MNK) * TEM
      PPMC(I,J,MNK) = PPMC(I,J,MNK) * TEM
   20 CONTINUE
   25 K = K + 1
      IF(PSPLT(J,K) .EQ. 0.0) GO TO 35
      TEM = PARTY(J,K) / PSPLT(J,K)
      DO 30 MNK=6,10
      PGBD(I,J,MNK) = PGBD(I,J,MNK) * TEM
      PGMC(I,J,MNK) = PGMC(I,J,MNK) * TEM
      PPBF(I,J,MNK) = PPBF(I,J,MNK) * TEM
      PPTC(I,J,MNK) = PPTC(I,J,MNK) * TEM
      PPMC(I,J,MNK) = PPMC(I,J,MNK) * TEM
   30 CONTINUF
   35 K = K + 1
      IF(PSPLT(J,K) .FQ. 0.0) GO TO 45
      TEM = PARTY(J,K) / PSPLT(J,K)
      DO 40 MNK=11,14
      PGBD(I,J,MNK) = PGBD(I,J,MNK) * TEM
      PGMC(I,J,MNK) = PGMC(I,J,MNK) * TEM
      PPBF(I,J,MNK) = PPBF(I,J,MNK) * TEM
      PPTC(I,J,MNK) = PPTC(I,J,MNK) * TEM
      PPMC(I,J,MNK) = PPMC(I,J,MNK) * TEM
   40 CONTINUE
   45 K = K + 1
      IF(PSPLT(J,K) .ED. 0.0) GO TO 50
      TEM = PARTY(J,K) / PSPLT(J,K)
      PGBD(I,J,15) = PGBD(I,J,15) * TEM
      PGMC(I,J,15) = PGMC(I,J,15) * TEM
      PPBF(I,J,15) = PPBF(I,J,15) * TEM
      PPTC(I,J,15) = PPTC(I,J,15) * TEM
      PPMC(I,J,15) = PPMC(I,J,15) * TEM
   50 CONTINUE
      DO 55 I=1,NWGP
      DO 55 J=1,NBK
      DO 55 K=1,15
      GRBD(I,J,K) = GRBD(I,J,K) + PGBD(I,J,K)
      GRMC(I,J,K) = GRMC(I,J,K) + PGMC(I,J,K)
      PTBF(I,J,K) = PTBF(I,J,K) + PPBF(I,J,K)
      PTCU(I,J,K) = PTCU(I,J,K) + PPTC(I,J,K)
      PTMC(I,J,K) = PTMC(I,J,K) + PPMC(I,J,K)
   55 CONTINUE
C
C COMPUTE TOTAL VOLUMES BY BLOCK AND TYPE.
C
      DO 90 I=1,NWGP
      DO 90 J=1,NBK
      K = I + (I - 1) * 5
      DO 70 MNK=1,3
      BFTB(J,K) = BFTB(J,K) + PTBF(I,J,MNK)
      CFTB(J,K) = CFTB(J,K) + PTCU(I,J,MNK)
   70 CMTB(J,K) = CMTB(J,K) + PTMC(I,J,MNK)
      K = K + 1
      DO 75 MNK=4,5
      BFTB(J,K) = BFTB(J,K) + PTBF(I,J,MNK)
      CFTB(J,K) = CFTB(J,K) + PTCU(I,J,MNK)
   75 CMTB(J,K) = CMTB(J,K) + PTMC(I,J,MNK)
      K = K + 1
      DO 80 MNK=6,10
      BFTB(J,K) = BFTB(J,K) + PTBF(I,J,MNK)
      CFTB(J,K) = CFTB(J,K) + PTCU(I,J,MNK)
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```
 80 CMTB(J,K) = CMTB(J,K) + PTMC(I,J,MNK)
    K = K + 1
    DO 85 MNK=11,14
    BFTB(J,K) = BFTB(J,K) + PTBF(I,J,MNK)
    CFTB(J,K) = CFTB(J,K) + PTCU(I,J,MNK)
 85 CMTB(J,K) = CMTB(J,K) + PTMC(I,J,MNK)
    K = K + 1
    BFTB(J,K) = BFTB(J,K) + PTBF(I,J,15)
    CFTB(J,K) = CFTB(J,K) + PTCU(I,J,15)
    CMTB(J,K) = CMTB(J,K) + PTMC(I,J,15)
 90 CONTINUE
C
C COMPUTE TOTAL VOLUMES BY WORKING GROUP AND AGE CLASS.
C
    DO 95 I=1,NWGP
    DO 95 J=1,NBK
    DO 95 K=1,15
    ABFAG(I,K) = ABFAG(I,K) + PTBF(I,J,K)
 95 AMCAG(I,K) = AMCAG(I,K) + PTMC(I,J,K)
C
C CONVERT WORK TOTALS TO AREAS AND VOLUMES BY BLOCK AND TYPE.
C
    DO 100 I=1,NBK
    DO 100 J=1,27
    IF(PSPLT(I,J) .EQ. 0.0) GO TO 100
    TEM = PARTY(I,J) / PSPLT(I,J)
    PBFT(I,J) = PBFT(I,J) * TEM
    PCMT(I,J) = PCMT(I,J) * TEM
    PCTA(I,J) = PCTA(I,J) * TEM
    PCTB(I,J) = PCTB(I,J) * TEM
    PHLP(I,J) = PHLP(I,J) * TEM
    PDPN(I,J) = PDPN(I,J) * TEM
    PPFN(I,J) = PPFN(I,J) * TEM
    PPCR(I,J) = PPCR(I,J) * TEM
    PSLV(I,J) = PSLV(I,J) * TEM
    PUNC(I,J) = PUNC(I,J) * TEM
100 CONTINUE
C
C COMPUTE TOTAL VOLUMES OF BLOCKS AND WORKING CIRCLE.
C
    DO 105 I=1,NBK
    DO 105 J=1,27
    BFTH(I,J) = BFTH(I,J) + PBFT(I,J)
    CMTH(I,J) = CMTH(I,J) + PCMT(I,J)
    CUTA(I,J) = CUTA(I,J) + PCTA(I,J)
    CUTB(I,J) = CUTB(I,J) + PCTB(I,J)
    HELP(I,J) = HELP(I,J) + PHLP(I,J)
    OPEN(I,J) = OPEN(I,J) + PDPN(I,J)
    PDCFN(I,J) = PDCFN(I,J) + PPFN(I,J)
    PDCFR(I,J) = PDCFR(I,J) + PPCR(I,J)
    SLVG(I,J) = SLVG(I,J) + PSLV(I,J)
    UNCML(I,J) = UNCML(I,J) + PUNC(I,J)
105 CONTINUE
    DO 110 I=1,NBK
    DO 110 J=1,27
    BFBLK(I) = BFBLK(I) + BFTB(I,J)
    CFMER(I) = CFMER(I) + CMTB(I,J)
    SSPT = SSPT + SPLT(I,J)
    SUNC = SUNC + UNCML(I,J)
110 TCF(I) = TCF(I) + CFTB(I,J)
    DO 120 I=1,NBK
    SBDF = SBDF + BFBLK(I)
    SCFM = SCFM + CFMER(I)
120 STCF = STCF + TCF(I)
C
C COMPUTE BLOCK VOLUMES BY WORKING GROUP.
C
    M = 1
    N = 5
    DO 130 I=1,NWGP
    DO 125 J=1,NBK
    DO 125 K=M,N
    BFSP(I,J) = BFSP(I,J) + BFTB(J,K)
    CMSP(I,J) = CMSP(I,J) + CMTB(J,K)
125 TCSP(I,J) = TCSP(I,J) + CFTB(J,K)
    M = M + 5
    N = N + 5
130 CONTINUE
C
C COMPUTE VOLUMES BY WORKING GROUP.
C
    DO 135 I=1,NWGP
    DO 135 J=1,NBK
    SBF(I) = SBF(I) + BFSP(I,J)
    SMC(I) = SMC(I) + CMSP(I,J)
135 STC(I) = STC(I) + TCSP(I,J)
    IF(TMBR .EQ. 0.0) GO TO 210
C
C COMPUTE AREAS BY COMBINATIONS OF WORKING GROUP, BLOCK, AND AGE.
C
    DO 185 I=1,NWGP
    DO 180 J=1,NBK
    DO 180 K=1,15
    IF(TPB(I,J) .EQ. 0.0) GO TO 180
    PAFN(I,J,K) = PASP(I,J) * PAFN(I,J,K) / TPB(I,J)
    PARG(I,J,K) = PASP(I,J) * PARG(I,J,K) / TPB(I,J)
180 CONTINUE
185 CONTINUE
    DO 190 I=1,NWGP
    DO 190 J=1,NBK
    DO 190 K=1,15
    ACFNL(I,J,K) = ACFNL(I,J,K) + PAFN(I,J,K)
190 ACRGN(I,J,K) = ACRGN(I,J,K) + PARG(I,J,K)
C
C COMPUTE PERIODIC ANNUAL INCREMENT.
C
    DO 200 I=1,NWGP
    DO 200 J=1,NBK
    DO 200 K=1,15
    PAIBD(I) = GRBD(I,J,K) + PAIBD(I)
    PAICU(I) = GRMC(I,J,K) + PAICU(I)
200 CONTINUE
    DO 205 I=1,NWGP
    IF(TIME .EQ. 0.0) GO TO 205
    PAIBD(I) = PAIBD(I) / TIME
    PAICU(I) = PAICU(I) / TIME
205 CONTINUE
C
C PRINT PAGE TYPE 13 - WORKING GROUP AND BLOCK VOLUMES.
C
210 WRITE (6,250)
250 FORMAT (1H1,//,60X,12HPAGE TYPE 13)
    WRITE (6,255)
255 FORMAT (1H0,//,47X,36HVOLUMES OF BLOCKS AND WORKING CIRCLE)
    WRITE (6,260) (FORET(I), I=1,19)
260 FORMAT (1H ,29X,18A4,A2)
    WRITE (6,265)
265 FORMAT (1H0,//,23X,6HTOTALS,4X,11HBLOCK NO. 1,4X,11HBLOCK NO. 2,
   14X,11HBLOCK NO. 3,4X,11HBLOCK NO. 4,4X,11HBLOCK NO. 5,4X,
   211HBLOCK NO. 6,4X,11HBLOCK NO. 7)
    DO 300 I=1,NWGP
    WRITE (6,270) (WGPNM(I,J),J=1,3)
270 FORMAT (1H0,/ ,1X,3A4)
    WRITE (6,275) STC(I),(TCSP(I,J),J=1,NBK)
275 FORMAT (1H0,13HTOTAL CU. FT.,8(4X,F11.1))
    WRITE (6,280) SMC(I),(CMSP(I,J),J=1,NBK)
280 FORMAT (1H0,14HMERCH. CU. FT.,8(3X,F11.1,1X))
    WRITE (6,285) SBF(I),(BFSP(I,J),J=1,NBK)
285 FORMAT (1H0,9HM BD. FT.,4X,8(4X,F11.1))
    IF(I .EQ. 4) GO TO 290
    GO TO 300
290 WRITE (6,295)
295 FORMAT (1H1,//,56X,19HPAGE TYPE 13, CONT.//)
300 CONTINUE
    WRITE (6,305)
305 FORMAT (1H ,//,2X,12HTOTAL VOLUME,/,3X,8HOF BLOCK)
    WRITE (6,310) STCF,(TCF(I),I=1,NBK)
310 FORMAT (1H0,13HTOTAL CU. FT.,8(4X,F11.1))
    WRITE (6,315) SCFM,(CFMER(I),I=1,NBK)
315 FORMAT (1H0,14HMERCH. CU. FT.,8(3X,F11.1,1X))
    WRITE (6,320) SBDF,(BFBLK(I),I=1,NBK)
320 FORMAT (1H0,9HM BD. FT.,4X,8(4X,F11.1))
    WRITE (6,325)
325 FORMAT(1H0,10X,47HCUBIC FEET IN HUNDREDS, BOARD FEET IN THOUSANDS)
C
C PRINT PAGE TYPE 14 - TYPE AREAS AND VOLUMES.
C
    WRITE (6,350)
350 FORMAT (1H1,//,60X,12HPAGE TYPE 14)
    WRITE (6,355)
355 FORMAT (1H0,/,39X,52HTOTAL AREAS AND VOLUMES OF BLOCKS AND WORKING
   1 CIRCLE)
    WRITE (6,260) (FORET(I), I=1,19)
    KOUNT = 1
    DO 395 I=1,NBK
    IF(ARBK(I) .EQ. 0.0) GO TO 395
    IF(KOUNT .EQ. 1) GO TO 365
    WRITE (6,360)
360 FORMAT (1H1,//,56X,19HPAGE TYPE 14, CONT.//)
365 WRITE (6,370)
370 FORMAT (1H0,5HBLOCK,7X,4HTYPE,12X,5HTOTAL,12X,5HTOTAL,12X,6HMERCH.
   1,13X,1HM,13X,5HACRES,11X,6HNUMBER)
    WRITE (6,375)
375 FORMAT (1H ,1X,3HNO.,9X,3HNO.,12X,5HACRES,11X,7HCU. FT.,11X,7HCU.
   1FT.,9X,7HBD. FT.,9X,8HLOW SITE,7X,10HOF RECORDS,//)
    KOUNT = 0
    DO 390 J=1,27
    WRITE (6,380) I,J,SARETY(I,J),CFTB(I,J),CMTB(I,J),BFTB(I,J),UNCML(
   1I,J),SPLT(I,J)
380 FORMAT (1H ,1X,I2,10X,I2,9X,5(F11.1,6X),F6.0)
    IF(J .LT. 27) GO TO 390
    WRITE (6,385)
385 FORMAT (1H0)
390 CONTINUE
395 CONTINUE
    WRITE (6,400) TMPD,STCF,SCFM,SBDF,SUNC,SSPT
400 FORMAT (1H0,6HTOTALS,18X,5(F11.1,6X),F6.0)
    WRITE (6,325)
    RETURN
    END
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Subroutine SUMRY

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    SUBROUTINE SUMRY
C
C TO COMPUTE DIFFERENCES BETWEEN PRESENT VOLUMES AND STOCKING GOALS.
C
    COMMON ADD,AGE(2),AGEC,BA(2),BAS(2),BASD,BAST,BAUS,BFMRCH,BFVOL,
   1CFVOL,DATE(6),DBH(2),DBHF,DBHD,DBHT,DEN(2),DENO,DCNT,DMUS,FBA(2),
   2FCTR(2),FDM(2),FDN(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSO,
   3HTST,KAK,KNO,MIN,MNK,NBK,NCMP,NSUB,NWGP,PDBHE,PRET,PRDD(2),REST,
   4SAVC,SBARB,SBARE,SBARG,SBAS,SITE,SLAND,TBA(2),TDM(2),TEM,TIME,TMPR
   5,TMPD,TDT(2),TDTU,TDTT,TVL(2),VDM(2),VLUS,DMR(2)
    COMMON ABFAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
   1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BDMAI(5),BFAGE(5,15)
   2,BFINT(5),CFAGE(5,15),CFBF(5,14),CDMBF(5),COMCU(5),CUCY(5),CUINT(5
   3),CUMAI(5),DBHTH(5,14),DELAY(5),DENTH(5,14),DLEV(5),FNBD(5),
   4FNCU(5),GROWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
   5,NSI(5),DPBD(5),DPCU(5),PAIBD(5),PAICU(5),PDDR(5),REGN(5,3,14),
   6RINT(5),SARSP(5),SBF(5),SHELT(5,2,14),SHWO(5,2,14),SMC(5),SMSP(5),
   7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
   8WGNUM(5),WGPDES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
    COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
   17),CUTB(7,27),HELP(7,27),NSBK(7),OPEN(7,27),PBRSI(7,14),PDCFN(7,27
   2),PDCFR(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLT(
   37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
    COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBD(5,7
   1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
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C
      COMMON /BLKC/ ANNAC,ANNBD,ANNCU,FINB(5),FINC(5),FNAC(5),RGAC(5),
     1RGBO(5),RGCU(5),SAHP(5),SANCUT(5),SATH(5),SBFR(5),SBH(5),SBSV(5),
     2SCA(5,7),SCB(5,7),SCN(5),SCNB(5,7),SCNT(25),SCR(5),SCRB(5,7),
     3SCRT(25),SCU(5,7),SCUR(5),SFNL(5),SFR(5),SHL(5,7),SIDLA,SIDLB,
     4SIDLC,SOP(5,7),SOPTA(5),SOPTB(5),SOPTC(5),SSL(5,7),STBS(25),STFO
     5(25),STHP(25),STHR(25),STLV(25),STNC(25),STON(25),THAC(5),THBO(5),
     6THCU(5),TOTAC(5),TOTBD(5),TOTCU(5),SBM(5,7)
C
      COMMON /BLKE/ RABDF(5),RABDI(5),RABDR(5),RABT(5),RACFN(5),RACIT(5)
     1,RACRG(5),RATC(5),SRABO,SRACF
C
      DIMENSION DFBF(5,15),DFMC(5,15),SDBF(5),SDMC(5)
C
C INITIALIZE VARIABLES COMPUTED BY THIS ROUTINE.
C
      DO 1 I=1,NWGP
      FINB(I)  = 0.0
      FINC(I)  = 0.0
      FNAC(I) = 0.0
      RABDF(I) = 0.0
      RABDI(I) = 0.0
      RABDR(I) = 0.0
      RABT(I) = 0.0
      RACFN(I) = 0.0
      RACIT(I) = 0.0
      RACRG(I) = 0.0
      RATC(I) = 0.0
      RGAC(I) = 0.0
      RGBO(I)  = 0.0
      RGCU(I)  = 0.0
      SAHP(I) = 0.0
      SANCUT(I) = 0.0
      SATH(I) = 0.0
      SBFR(I) = 0.0
      SBH(I) = 0.0
      SBSV(I) = 0.0
      SCN(I) = 0.0
      SCR(I) = 0.0
      SCUR(I) = 0.0
      SDBF(I) = 0.0
      SDMC(I) = 0.0
      SFNL(I) = 0.0
      SFR(I) = 0.0
      SOPTA(I) = 0.0
      SOPTB(I) = 0.0
      SOPTC(I) = 0.0
      THAC(I)  = 0.0
      THBO(I)  = 0.0
      THCU(I)  = 0.0
      TOTAC(I) = 0.0
      TOTBD(I) = 0.0
      TOTCU(I) = 0.0
      DO 1 J=1,NBK
      SBM(I,J) = 0.0
      SCA(I,J) = 0.0
      SCB(I,J) = 0.0
      SCNB(I,J) = 0.0
      SCRB(I,J) = 0.0
      SCU(I,J) = 0.0
      SHL(I,J) = 0.0
      SOP(I,J) = 0.0
      SSL(I,J) = 0.0
    1 CONTINUE
      DO 3 I=1,2
    3 TOT(I) = 0.0
      DO 5 I=1,NWGP
      DO 5 J=1,15
      DFBF(I,J) = 0.0
    5 DFMC(I,J) = 0.0
      DO 10 I=1,25
      SCNT(I) = 0.0
      SCRT(I) = 0.0
      STBS(I) = 0.0
      STFO(I) = 0.0
      STHP(I) = 0.0
      STHR(I) = 0.0
      STLV(I) = 0.0
      STNC(I) = 0.0
   10 STON(I) = 0.0
      ANNAC = 0.0
      ANNBD = 0.0
      ANNCU = 0.0
      SIDLA = 0.0
      SIDLB = 0.0
      SIDLC = 0.0
      SRABO = 0.0
      SRACF = 0.0
      STHBF = 0.0
      STHCM = 0.0
C
C COMPUTE DIFFERENCES BETWEEN ACTUAL AND DESIRED GROWING STOCKS.
C
      DO 15 I=1,NWGP
      DO 15 J=1,15
      DFBF(I,J) = ABFAG(I,J) - BFAGE(I,J)
   15 DFMC(I,J) = AMCAG(I,J) - CFAGE(I,J)
C
C COMPUTE TOTAL DIFFERENCES BETWEEN ACTUAL AND DESIRED STOCKS.
C
      DO 20 I=1,NWGP
      DO 20 J=1,15
      SDBF(I) = SDBF(I) + DFBF(I,J)
   20 SDMC(I) = SDMC(I) + DFMC(I,J)
C
C PRINT PAGE TYPE 3 - ACTUAL AND DESIRED GROWING STOCKS AND DIFFERENCES.
C
      DO 100 KA=1,NWGP
      WRITE (6,30)
   30 FORMAT (1H1,/,60X,11HPAGE TYPE 3)
      WRITE (6,32)
   32 FORMAT (1H0,34X,58HCOMPARISON OF ACTUAL GROWING STOCK WITH GROWING
     1 STOCK GOAL)
      WRITE (6,34) (FORET(I),I=1,19)
   34 FORMAT (1H ,29X,18A4,A2)
      WRITE (6,36) (WGPNM(KA,J),J=1,3)
   36 FORMAT (1H0,53X,16HWORKING GROUP - ,3A4,/)
      WRITE (6,38)
   38 FORMAT (1H ,39X,52HTHOUSANDS OF BOARD FEET IN TREES OF COMMERCIAL
     1SIZE.)
      WRITE (6,40)
   40 FORMAT (1H0,12X,3HAGE,11X,14HACTUAL GROWING,10X,13HGROWING STOCK,1
     15X,6HVOLUME,15X,9HSTATUS OF)
      WRITE (6,42)
   42 FORMAT (1H ,11X,5HCLASS,14X,5HSTOCK,19X,4HGOAL,18X,10HDIFFERENCE,1
     11X,13HACTUAL VOLUME,/)
      DO 70 I=1,15
      J = I * 10
      IF(DFBF(KA,I) .LT. 0.0) GO TO 50
      IF(DFBF(KA,I) .EQ. 0.0) GO TO 60
      WRITE (6,45) J,ABFAG(KA,I),BFAGE(KA,I),DFBF(KA,I)
   45 FORMAT (1H ,12X,I3,11X,F14.1,9X,F14.1,9X,F14.1,14X,7HSURPLUS)
      GO TO 70
   50 WRITE (6,55) J,ABFAG(KA,I),BFAGE(KA,I),DFBF(KA,I)
   55 FORMAT (1H ,12X,I3,11X,F14.1,9X,F14.1,9X,F14.1,14X,7HDEFICIT)
      GO TO 70
   60 WRITE (6,65) J,ABFAG(KA,I),BFAGE(KA,I),DFBF(KA,I)
   65 FORMAT (1H ,12X,I3,11X,F14.1,9X,F14.1,9X,F14.1,14X,7HCORRECT)
   70 CONTINUE
      WRITE (6,75) SBF(KA),GVLBF(KA),SDBF(KA)
   75 FORMAT (1H0,11X,5HTOTAL,10X,F14.1,9X,F14.1,9X,F14.1,/)
      WRITE (6,80)
   80 FORMAT (1H0,31X,67HHUNDREDS OF MERCH. CUBIC FEET IN TREES 6.0 INCH
     1ES D.B.H. AND LARGER,/)
      WRITE (6,40)
      WRITE (6,42)
      DO 95 I=1,15
      J = I * 10
      IF(DFMC(KA,I) .LT. 0.0) GO TO 85
      IF(DFMC(KA,I) .EQ. 0.0) GO TO 90
      WRITE (6,45) J,AMCAG(KA,I),CFAGE(KA,I),DFMC(KA,I)
      GO TO 95
   85 WRITE (6,55) J,AMCAG(KA,I),CFAGE(KA,I),DFMC(KA,I)
      GO TO 95
   90 WRITE (6,65) J,AMCAG(KA,I),CFAGE(KA,I),DFMC(KA,I)
   95 CONTINUE
      WRITE (6,75) SMC(KA),SUMCF(KA),SDMC(KA)
  100 CONTINUE
C
C SUMMARIZE VOLUMES EXPECTED DURING NEXT PERIOD BY BLOCK AND TYPE.
C
      M = 1
      N = 5
      DO 115 K=1,NWGP
      DO 110 I=1,NBK
      DO 110 J=M,N
      SBM(K,I) = SBM(K,I) + BFTH(I,J)
      SCA(K,I) = SCA(K,I) + CUTA(I,J)
      SCB(K,I) = SCB(K,I) + CUTB(I,J)
      SCNB(K,I) = SCNB(K,I) + PDCFN(I,J)
      SCRB(K,I) = SCRB(K,I) + PDCFR(I,J)
      SCU(K,I) = SCU(K,I) + CMTH(I,J)
      SHL(K,I) = SHL(K,I) + HELP(I,J)
      SOP(K,I) = SOP(K,I) + OPEN(I,J)
      SSL(K,I) = SSL(K,I) + SLVG(I,J)
  110 CONTINUE
      M = M + 5
      N = N + 5
  115 CONTINUE
      DO 120 I=1,NBK
      DO 120 J=1,25
      SCNT(J) = SCNT(J) + PDCFN(I,J)
      SCRT(J) = SCRT(J) + PDCFR(I,J)
      STBS(J) = STBS(J) + BFTH(I,J)
      STFO(J) = STFO(J) + CUTB(I,J)
      STHP(J) = STHP(J) + HELP(I,J)
      STHR(J) = STHR(J) + CUTA(I,J)
      STLV(J) = STLV(J) + SLVG(I,J)
      STNC(J) = STNC(J) + CMTH(I,J)
      STON(J) = STON(J) + OPEN(I,J)
  120 CONTINUE
      DO 125 I=1,NWGP
      DO 125 J=1,NBK
      SAHP(I) = SAHP(I) + SHL(I,J)
      SATH(I) = SATH(I) + SOP(I,J)
      SBFR(I) = SBFR(I) + SBM(I,J)
      SBH(I) = SBH(I) + SCA(I,J)
      SBSV(I) = SBSV(I) + SSL(I,J)
      SCN(I) = SCN(I) + SCNB(I,J)
      SCR(I) = SCR(I) + SCRB(I,J)
      SCUR(I) = SCUR(I) + SCU(I,J)
      SFR(I) = SFR(I) + SCB(I,J)
  125 CONTINUE
C
C SUM THE ANNUAL CUTS BASED ON OPTIMUM AREA REGULATION BY WORKING GROUP
C AND WORKING CIRCLE.
C
      DO 130 I=1,NWGP
      DO 130 J=1,14
  130 SANCUT(I) = SANCUT(I) + ANCUT(I,J)
      DO 135 I=1,NWGP
      SFNL(I) = SANCUT(I)
      IF(SYST(I) .EQ. 0.0) SFNL(I) = 0.0
      K = PGOR(I) * 0.1 + 0.5
      IF(REGN(I,3,K) .GT. 0.0) SANCUT(I) = SANCUT(I) * 2.0
  135 CONTINUE
      DO 140 I=1,NWGP
      SOPTA(I) = SANCUT(I) + SFNL(I) + ACINT(I)
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      SOPTB(I) = DPBD(I) + FNBD(I) + BFINT(I)
      SOPTC(I) = DPCU(I) + FNCU(I) + CUINT(I)
      IF(WGPNM(I,1) .EQ. 4HOEEE) GO TO 140
      SIDLA = SIDLA + SOPTA(I)
      SIDLB = SIDLB + SOPTB(I)
      SIDLC = SIDLC + SOPTC(I)
  140 CONTINUE
C
C COMPUTE POSSIBLE ANNUAL CUTS DURING NEXT PERIOD - BASIS WORK INDEX.
C
      DO 150 I=1,NWGP
      DO 150 J=1,NBK
      DO 150 K=1,15
      RGAC(I) = RGAC(I) + ACRGN(I,J,K)
  150 FNAC(I) = ENAC(I) + ACENL(I,J,K)
      TEM = 1.0 / TIME
      DO 155 I=1,NWGP
      FINB(I) = SFR(I) * TEM
      FINC(I) = SCN(I) * TEM
      FNAC(I) = ENAC(I) * TEM
      RGAC(I) = PGAC(I) * TEM
      RGBO(I) = SBH(I) * TEM
      RGCU(I) = SCR(I) * TEM
      THAC(I) = (SATH(I) + SAHP(I)) * TEM
      THBD(I) = SBFR(I) * TEM
      THCU(I) = SCUR(I) * TEM
  155 CONTINUE
      DO 160 I=1,NWGP
      TOTAC(I) = RGAC(I) + FNAC(I) + THAC(I)
      TOTCU(I) = RGCU(I) + FINC(I) + THCU(I)
      TOTBD(I) = RGBO(I) + FINB(I) + THBD(I)
      ANNAC = ANNAC + TOTAC(I)
      ANNCU = ANNCU + TOTCU(I)
  160 ANNBD = ANNBD + TOTBD(I)
C
C COMPUTE ANNUAL CUT BY HEYER FORMULA USING M.A.I. FROM YIELD TABLES.
C
      DO 210 I=1,NWGP
      IF(ADJ(I) .EQ. 0.0) GO TO 190
      ALWBF(I) = BDMAI(I) + (SDBF(I) / ADJ(I))
      ALDWC(I) = CUMAI(I) + (SDMC(I) / ADJ(I))
      GO TO 200
  190 ALWBF(I) = BDMAI(I) + SDBF(I)
      ALOWC(I) = CUMAI(I) + SDMC(I)
  200 IF(ALWBF(I) .LT. 0.0) ALWBF(I) = 0.0
      IF(ALDWC(I) .LT. 0.0) ALDWC(I) = 0.0
  210 CONTINUE
      DO 220 I=1,NWGP
      IF(WGPNM(I,1) .EQ. 4HDEEE) GO TO 220
      TOT(1) = ALWBF(I) + TCT(1)
  220 TOT(2) = ALDWC(I) + TCT(2)
C
C COMPUTE AREA REGULATION VOLUMES FOR THIRD TABLE, PAGE TYPE 1.
C CHANGE MULTIPLIER OF RACIT AND RABDI IF GOAL OF ONE PRECOMMERCIAL
C THINNING IS NOT APPLICABLE.
C
      DO 230 I=1,NWGP
      IF(RGAC(I) .LE. 0.0) GO TO 226
      RACRG(I) = (RGCU(I) / RGAC(I)) * SANCUT(I)
      RABDR(I) = (RGBD(I) / RGAC(I)) * SANCUT(I)
  226 IF(ENAC(I) .LE. 0.0) GO TO 228
      RACFN(I) = (EINC(I) / FNAC(I)) * SENL(I)
      RABDF(I) = (FINB(I) / FNAC(I)) * SFNL(I)
  228 IF(SATH(I) .LE. 0.0) GO TO 230
      K = PDDR(I) * 0.1 + 0.5
      IF(REGN(I,3,K) .GT. 0.0) SANCUT(I) = SFNL(I)
      RACIT(I) = (THCU(I) / (SATH(I) * TEM)) * (ACINT(I) - SANCUT(I))
      RABDI(I) = (THBD(I) / (SATH(I) * TEM)) * (ACINT(I) - SANCUT(I))
  230 CONTINUE
      DO 240 I=1,NWGP
      RATC(I) = RACRG(I) + RACFN(I) + RACIT(I)
      RABT(I) = RABDR(I) + RABDF(I) + RABDI(I)
  240 CONTINUE
      DO 250 I=1,NWGP
      SRACF = SRACF + RATC(I)
      SRABD = SRABD + RABT(I)
  250 CONTINUE
      RETURN
      END
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Subroutine GIDE1

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      SUBROUTINE GIDE1
C
C PRINT PAGE TYPE 1 - SUMMARY OF RESULTS AND GUIDE TO MANAGEMENT.
C
      COMMON ADD,AGE(2),AGEO,BA(2),BAS(2),BASO,BAST,BAUS,BFMRCH,BFVOL,
     1CFVOL,DATE(6),DBH(2),DBHE,DBHD,DBHT,DEN(2),DENO,DENT,DMUS,FBA(2),
     2FCTR(2),FDM(2),FDN(2),FHT(2),EDRET(19),FVL(2),HT(2),HTCUM,HTSD,
     3HTST,KAK,KND,MIN,MNK,NBK,NCMP,NSUB,NWGP,PDBHE,PRET,PRDD(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLAND,THA(2),TOM(2),TEM,TIME,TMPR
     5,TMPO,TOT(2),TDTO,TOTT,TVL(2),VDM(2),VLUS,DMR(2)
      COMMON ABFAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCE(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BDMAI(5),BFAGE(5,15)
     2,BFINT(5),CEAGE(5,15),CEBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),DBHTH(5,14),DFLAY(5),DENTH(5,14),DLEV(5),FNBD(5),
     4FNCU(5),GROWB(5,2,14),GRDWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),DPBD(5),DPCU(5),PAIBD(5),PAICU(5),POOR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBF(5),SHFLT(5,2,14),SHWD(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SURCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     8WGNUM(5),WGPDES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),OPEN(7,27),PBRSI(7,14),PDCFN(7,27
     2),PDCFR(7,27),PSPLT(7,27),PUNC(7,27),SAPETY(7,35),SLVG(7,27),SPLT(
     37,27),TPTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACENL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBD(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      COMMON /BLKC/ ANNAC,ANNBD,ANNCU,EINB(5),FINC(5),ENAC(5),RGAC(5),
     1RGBD(5),RGCU(5),SAHP(5),SANCUT(5),SATH(5),SBFR(5),SBH(5),SBSV(5),
     2SCA(5,7),SCB(5,7),SCN(5),SCNB(5,7),SCNT(25),SCR(5),SCRB(5,7),
     3SCRT(25),SCU(5,7),SCUR(5),SFNL(5),SER(5),SHL(5,7),SIDLA,SIDLB,
     4SIDLC,SCP(5,7),SOPTA(5),SOPTB(5),SOPTC(5),SSL(5,7),STBS(25),STED
     5(25),STHP(25),STHR(25),STLV(25),STNC(25),STDN(25),THAC(5),THBD(5),
     6THCU(5),TOTAC(5),TOTBD(5),TOTCU(5),SBM(5,7)
C
      COMMON /BLKE/ PAHDF(5),RABDI(5),RABDR(5),RABT(5),RACEN(5),RACIT(5)
     1,RACRG(5),RATC(5),SRABD,SRACF
C
      DIMENSION A(3)
C
      DATA A/3*1H /
C
      CURS = SLAND - STYP(32)
      WRITE (6,505)
  505 FORMAT (1H1,59X,11HPAGE TYPE 1)
      WRITE (6,510) (FCRET(I), I=1,19)
  510 FORMAT (1H0,/,10X,21HGUIDE FOR MANAGEMENT ,18A4,A2)
      WRITE (6,515) (DATE(I),I=1,6)
  515 FORMAT (1H0,5X,25HBASED ON DATA CURRENT TO ,6A4)
      WRITE (6,520) SLAND,CURS,STYP(32),TMBP,SBARE,STYP(31),STYP(28)
  520 FORMAT (1H0,31HTHE WORKING CIRCLE CONSISTS OF ,E10.1,18H ACRES. OF
     1 THESE, ,F10.1,29H ACRES ARE OWNED BY U.S. AND ,F10.1,19H ACRES AR
     2E INTERIOR/1H ,45HTRACTS OF OTHER OWNERSHIP. OUR AREA INCLUDES ,F1
     30.1,17H TIMBERED ACRES, ,F10.1,18H PLANTABLE ACRES, ,F10.1,17H ACR
     4ES MANAGED AS/1H ,11HRANGE, AND ,F10.1,106H ACRES OF HIGH RECREATI
     5ON USE WHERE TIMBER YIELDS ARE INCIDENTAL AND NOT REGULATED. SEE P
     6AGE TYPE 5, 6, 7,/1H ,31HAND 14 FOR AREA CLASSIFICATION.)
      WRITE (6,530)
  530 FORMAT (1H0,70HTHE TIMBER RESOURCE OF THIS WORKING CIRCLE WILL BE
     1MANAGED AS FOLLOWS-   )
      DO 560 I=1,NWGP
      WRITE (6,550) (WGPNM(I,J),J=1,3),(WGPDES(I,K),K=1,20)
  550 FORMAT (1H ,15X,3A4,3H - ,20A4)
  560 CONTINUE
      WRITE (6,570)
  570 FORMAT (1H0,58HREGULATION OF THE CUT WILL BE BY AREA WITH A VOLUME
     1 CHECK.)
      WRITE (6,575)
  575 FORMAT (1H0,125HWITH THE DECISIONS AND AREAS ON PAGES TYPE 4 AND 1
     11 AND WITH BALANCED DISTRIBUTION OF AGE CLASSES, ALLOWABLE ANNUAL
     2CUT WOULD/1H ,14HBE AS FOLLOWS-)
      WRITE (6,580)
  580 FORMAT (1H0,64X,11HHUNDREDS OF/1H ,42X,5HACRES,19X,7HCU. FT.,17X,9
     1HM BD. FT.)
      WRITE (6,590)
  590 FORMAT (1H0,11X,17HREGENERATION CUTS,/)
      DO 605 I=1,NWGP
      K = PCCR(I) * 0.1 + 0.5
      IF(REGN(I,3,K) .GT. 0.0) SANCUT(I) = SANCUT(I) * 2.0
      WRITE (6,600) (WGPNM(I,J),J=1,3),SANCUT(I),DPCU(I),DPBD(I)
  600 FORMAT (1H ,15X,3A4,11X,F11.1,14X,F11.1,14X,F11.1)
  605 CONTINUE
      WRITE (6,610)
  610 FORMAT (1H0,11X,18HFINAL REMOVAL CUTS,/)
      DO 615 I=1,NWGP
      WRITE (6,600) (WGPNM(I,J),J=1,3),SFNL(I),FNCU(I),FNBD(I)
  615 CONTINUE
      WRITE (6,620)
  620 FORMAT (1H0,11X,17HINTERMEDIATE CUTS,/)
      DO 625 I=1,NWGP
      WRITE (6,600) (WGPNM(I,J),J=1,3),ACINT(I),CUINT(I),BFINT(I)
  625 CONTINUE
      WRITE (6,630)
  630 FORMAT (1H0,11X,18HTOTAL FOR ONE YEAR,/)
      DO 635 I=1,NWGP
      WRITE (6,600) (WGPNM(I,J),J=1,3),SOPTA(I),SOPTC(I),SOPTB(I)
  635 CONTINUE
      WRITE (6,640) SIDLA,SIDLC,SIDLB
  640 FORMAT (1H0,11X,16HTOTAL ALL GROUPS,11X,F11.1,14X,F11.1,14X,F11.1)
      WRITE (6,650)
  650 FORMAT (1H0,1X,62HTOTAL ALL GROUPS DOES NOT INCLUDE DEFERRED GROUP
     1S, IF PRESENT.)
      WRITE (6,665)
  665 FORMAT (1H1,//,56X,18HPAGE TYPE 1, CONT.)
      WRITE (6,670)
  670 FORMAT (1H0,123HONLY COMMERCIAL VOLUMES ARE INCLUDED IN THE TABLES
     1 OF PAGE TYPE 1. CUTS ARE ASSIGNED TO BOARD FOOT TOTALS IF POSSIBL
     2E. THEY/1H ,124HAPPEAR IN CUBIC-FOOT TOTALS ONLY WHEN COMMERCIAL S
     3AWLOG CUTS ARE NOT POSSIBLE. AREAS OF INTERMEDIATE CUTS INCLUDE AC
     4REAGE OF/1H ,35HNONCOMMERCIAL SHOWN ON PAGE TYPE 2.)
      WRITE (6,680)
  680 FORMAT (1H0,125HACTUAL VOLUMES CUT DURING THE NEXT PERIOD COULD BE
     1 AS SHOWN ON PAGES TYPE 2 IF ALL POSSIBLE CULTURAL OPERATIONS, AS
     2INDICATED/1H ,68HBY WORK CODES, WERE PERFORMED. POTENTIAL ANNUAL C
     3UTS WOULD THEN BE--)
      WRITE (6,580)
      WRITE (6,590)
      DO 700 I=1,NWGP
      WRITE (6,600) (WGPNM(I,J),J=1,3),RGAC(I),RGCU(I),RGBD(I)
  700 CONTINUE
      WRITE (6,610)
      DO 705 I=1,NWGP
      WRITE (6,600) (WGPNM(I,J),J=1,3),FNAC(I),FINC(I),FINB(I)
  705 CONTINUE
      WRITE (6,620)
      DO 710 I=1,NWGP
      WRITE (6,600) (WGPNM(I,J),J=1,3),THAC(I),THCU(I),THBD(I)
  710 CONTINUE
      WRITE (6,630)
      DO 715 I=1,NWGP
      WRITE (6,600) (WGPNM(I,J),J=1,3),TOTAC(I),TOTCU(I),TOTBD(I)
  715 CONTINUE
      WRITE (6,640) ANNAC,ANNCU,ANNBD
      WRITE (6,665)
      WRITE (6,720)
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720 FORMAT (1HO,109HTHE FIRST TABLE, ABOVE, REPRESENTS YIELOS FROM ARE
   1A REGULATION WHEN VOLUME AND AREA GOALS HAVE BEEN ATTAINEO.)
    WRITE (6,725)
725 FORMAT (1HO,50HTHE SECONO TABLE CAN REPRESENT AREA REGULATION IF-/
   11H ,BX,4BH(1) VOLUME ANO AREA GOALS HAVE NOT BEEN ATTA(NEO/1H ,BK,
   296H(2) WORX COOING IS SUCH THAT THE AREA VALUES OF THE SECONO TABL
   3E EQUAL AREAS OF THE FIRST TABLE.)
    WRITE (6,730)
730 FORMAT (1HO,B7HIF NE(THER OF THESE ALTERNATIVES APPLY, YIELOS FROM
   1 AREA REGULATION WILL BE AS FOLLOWS-)
    WRITE (6,5B0)
    WRITE (6,590)
    00 732 (=1,NWGP
    WRITE (6,600) (WGPNM(I,J),J=1,3),SANCUT(I),RACRG(I),RABOR(I)
732 CONTINUE
    WRITE (6,610)
    00 734 I=1,NWGP
    WRITE (6,600) (WGPNM(I,J),J=1,3),SFNL(I),RACFN(I),RABOF(I)
734 CONTINUE
    WRITE (6,620)
    00 736 I=1,NWGP
    WRITE (6,600) (WGPNM(I,J),J=1,3),ACINT(I),RACIT(I),RABOI(I)
736 CONTINUE
    WRITE (6,630)
    00 73B I=1,NWGP
    WRITE (6,600) (WGPNM(I,J),J=1,3),SOPTA(I),RATC(I),RABT(I)
738 CONTINUE
    WRITE (6,640) S(OLA,SRACF,SRABO
    WRITE (6,665)
    WRITE (6,740)
740 FORMAT (1HO,//,1K,B5HFORMULA COMPUTATION OF ALLOWABLE ANNUAL CUT.
   1CUBIC-FOOT VOLUMES INCLUOE SAWLOG TREES-)
    WRITE (6,745)
745 FORMAT (1HO,11X,79HHEYER FORMULA WITH M.A.I. FROM OPTIMUM YIELO TA
   1BLES ANO COMPUTEO GROWING STOCKS)
    WRITE (6,750)
750 FORMAT (1HO,42K,10HAOJUSTMENT,12K,11HHUNOREOS OF/1H ,44K,6HPERIOO,
   116K,7HCU. FT.,17X,9HM BO. FT.,/)
    00 755 I=1,NWGP
    (F(WGPNM(I,1) .EQ. 4HCEFE) GO TO 755
    WRITE (6,600) (WGPNM(I,J),J=1,3),AOJ(I),ALOWC(I),ALWBF(()
755 CONTINUE
    WRITE (6,760) TOT(2),TOT(1)
760 FORMAT (1HO,15K,5HTOTAL,43K,F11.1,14K,F11.1)
    WRITE (6,765)
765 FORMAT (1HO,11K,65HMEAN ANNUAL INCREMENTS USED TO OBTAIN THE RESUL
   1TS TABULATEO ABOVE)
    WRITE (6,750)
    00 770 (=1,NWGP
    WRITE (6,600) (WGPNM(I,J),J=1,3),AOJ(I),CUMAI(I),BOMAI(()
770 CONTINUE
    WRITE (6,775)
775 FORMAT (1HO,120HFORMULA COMPUTATIONS ARE BASEO ON VOLUME ANO AREA
   1COMPUTATIONS SUMMARIZEO ON OTHER PAGES. VOLUME GOALS ARE ON PAGES
   2TYPE/1H ,120H4, B, 9, 10, ANO 11. ACTUAL AREAS ANO VOLUMES ARE ON
   3PAGES TYPE 6, 7, 13, ANO 14. CUBIC VOLUMES INCLUOE ALL TREES LARGE
   4R/1H ,6BHANO OLOER THAN MINIMUM LIMITS FOR INCLUSION IN GROWING ST
   5OCK VOLUME.)
    WRITE (6,B00)
B00 FORMAT (1HO,124HSTANOS SELECTEO FOR HARVEST ANO REGENERATION WILL
   1INCLUOE THOSE CLASSEO AS WORK INOEK 4, 5, OR 6. IT IS EXPECTEO THA
   2T NEARLY/1H ,126HEQUAL AREAS WILL BE CUT ANNUALLY IN STANOS OF EAC
   3H SITE CLASS. IF THIS IS NOT OESIRABLE, FACTORS THAT INOICATE RELA
   4TIVE VOLUME/1H ,59HPROOUCT(ON (PAGE TYPE 12) MAY BE USEO FOR AREA
   5AOJUSTMENTS.)
    WRITE (6,B05)
B05 FORMAT (1HO,100HIF WORX IS OONE OURING NEXT PERIOO AS SPECIFIEO BY
   1 WORK INOEKES, PERIOOIC ANNUAL INCREMENTS WILL BE-)
    WRITE (6,810)
B10 FORMAT (1HO,44K,11HHUNOREOS OF/1H ,46K,7HCU. FT.,17X,9HM BO. FT.,/
   1)
    00 B20 (=1,NWGP
    WRITE (6,B15) (WGPNM(I,J),J=1,3),PAICU(I),PAIBO(I)
B15 FORMAT (1H ,15X,3A4,19K,FB.1,16K,FB.1)
820 CONTINUE
    RETURN
    ENO
```

Subroutine GIDE2

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      SUBROUTINE GIOE2
C
C PRINT PAGE TYPE 2 - POTENTIAL WORK ANO YIELOS FOR NEXT PERIOO.
C
      COMMON AOO,AGE(2),AGEO,BA(2),BAS(2),BASO,BAST,BAUS,BFMRCH,BFVOL,
     1CFVOL,OATE(6),OBH(2),OBHE,OBHO,OBHT,OEN(2),OENO,OENT,OMUS,FBA(2),
     2FCTR(2),FOM(2),FON(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSO,
     3HTST,XAK,KNO,MIN,MNK,NBX,NCMP,NSUB,NWGP,POBHE,PRET,PROD(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLANO,TBA(2),TOM(2),TEM,TIME,TMBR
     5,TMPO,TOT(2),TOTO,TOTT,TVL(2),VOM(2),VLUS,OMR(2)
      COMMON ABFAG(5,15),ACINT(5),AOJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BOMAI(5),BFAGE(5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),OBHTH(5,14),OELAY(5),OENTH(5,14),OLEV(5),FNBO(5),
     4FNCU(5),GROWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),OPBO(5),OPCU(5),PAIBO(5),PAICU(5),POOR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBF(5),SHELT(5,2,14),SHWO(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     BWGNUM(5),WGPOES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBX(7),OPEN(7,27),PBRSI(7,14),POCFN(7,27
     2),POCFR(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLT(
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBO(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      COMMON /BLKC/ ANNAC,ANNBO,ANNCU,FINB(5),FINC(5),FNAC(5),RGAC(5),
     1RGBO(5),RGCU(5),SAHP(5),SANCUT(5),SATH(5),SBFR(5),S8H(5),SBSV(5),
     2SCA(5,7),SCB(5,7),SCN(5),SCNB(5,7),SCNT(25),SCR(5),SCRB(5,7),
     3SCRT(25),SCU(5,7),SCUR(5),SFNL(5),SFR(5),SHL(5,7),SIOLA,SIOLB,
     4SIOLC,SOP(5,7),SOPTA(5),SOPTB(5),SOPTC(5),SSL(5,7),STBS(25),STFO
     5(25),STHP(25),STHR(25),STLV(25),STNC(25),STON(25),THAC(5),THBO(5),
     6THCU(5),TOTAC(5),TOTBO(5),TOTCU(5),SBM(5,7)
C
      OO 490 KA=1,NWGP
      SSUM = 0.0
      SSUM = SATH(XA) + SCUR(XA) + SBFR(KA) + SBSV(XA) + SBH(KA) +
     1SCR(KA) + SFR(KA) + SCN(KA) + SAHP(KA)
      IF(SSUM .EQ. 0.0) GO TO 500
      WRITE (6,5)
    5 FORMAT (1H1,//,60X,11HPAGE TYPE 2)
      WRITE (6,10)
   10 FORMAT (1HO,40K,46HPOTENTIAL WORK LOAO ANO YIELOS FOR NEKT PERIOO)
      WRITE (6,15) (FORET(I), I=1,19)
   15 FORMAT (1H ,29X,18A4,A2)
      KOUNT = 0
      IF(SATH(KA) .EQ. 0.0) GO TO 100
      KOUNT = XOUNT + 1
      WRITE (6,20)
   20 FORMAT (1HO,/,41K,47HACRES OF COMMERCIAL THINNING OURING NEKT PERI
     1OO)
      IF(XA .EQ. 2) GO TO 30
      IF(KA .EQ. 3) GO TO 40
      IF(XA .EQ. 4) GO TO 50
      IF(XA .EQ. 5) GO TO 60
      WRITE (6,25)
   25 FORMAT (1HO,/,4X,5HBLOCX,12K,6HTYPE 1,13X,6HTYPE 2,13X,6HTYPE 3,13
     1K,6HTYPE 4,13X,6HTYPE 5,14K,5HTOTAL,/)
      MX = 1
      NK = 5
      GO TO 70
   30 WRITE (6,35)
   35 FORMAT (1HO,/,4X,5HBLOCX,12X,6HTYPE 6,13X,6HTYPE 7,13X,6HTYPE 8,13
     1K,6HTYPE 9,12X,7HTYPE 10,14K,5HTOTAL,/)
      MX = 6
      NK = 10
      GO TO 70
   40 WRITE (6,45)
   45 FORMAT (1HO,/,4K,5HBLOCX,11X,7HTYPE 11,12X,7HTYPE 12,12K,7HTYPE 13
     1,12K,7HTYPE 14,12K,7HTYPE 15,14X,5HTOTAL,/)
      MK = 11
      NK = 15
      GO TO 70
   50 WRITE (6,55)
   55 FORMAT (1HO,/,4K,5HBLOCX,11K,7HTYPE 16,12X,7HTYPE 17,12K,7HTYPE 18
     1,12X,7HTYPE 19,12X,7HTYPE 20,14X,5HTOTAL,/)
      MX = 16
      NK = 20
      GO TO 70
   60 WRITE (6,65)
   65 FORMAT (1HO,/,4K,5HBLOCK,11X,7HTYPE 21,12K,7HTYPE 22,12K,7HTYPE 23
     1,12K,7HTYPE 24,12K,7HTYPE 25,14X,5HTOTAL,/)
      MK = 21
      NK = 25
   70 OO BO I=1,NBK
      WRITE (6,75) I,(OPEN(I,J),J=MK,NK),SOP(KA,I)
   75 FORMAT (1H ,4K,I2,10X,F11.1,5(BK,F11.1))
   80 CONTINUE
      WRITE (6,B5) (STON(I),I=MK,NK),SATH(KA)
   B5 FORMAT (1HO,3X,5HTOTAL,6(8K,F11.1))
  100 IF(SCUR(XA) .EQ. 0.0) GO TO 150
      KOUNT = KOUNT + 1
      WRITE (6,105)
  105 FORMAT (1HO,//,44X,39HHUNOREOS OF CU. FT. REMOVEO BY THINNING)
      IF(KA .EQ. 2) GO TO 110
      IF(KA .EQ. 3) GO TO 115
      IF(KA .EQ. 4) GO TO 120
      IF(KA .EQ. 5) GO TO 125
      WRITE (6,25)
      MK = 1
      NK = 5
      GO TO 130
  110 WRITE (6,35)
      MK = 6
      NX = 10
      GO TO 130
  115 WRITE (6,45)
      MK = 11
      NK = 15
      GO TO 130
  120 WRITE (6,55)
      MX = 16
      NK = 20
      GO TO 130
  125 WRITE (6,65)
      MX = 21
      NK = 25
  130 OO 135 I=1,NBK
      WRITE (6,75) I,(CMTH(I,J),J=MX,NX),SCU(XA,I)
  135 CONTINUE
      WRITE(6,85) (STNC(I),I=MX,NX),SCUR(KA)
  150 IF(SBFR(KA) .EQ. 0.0) GO TO 190
      XOUNT = KOUNT + 1
      WRITE (6,155)
  155 FORMAT (1HO,//,50K,29HM BO. FT. REMOVEO BY THINNING)
      IF(KA .EQ. 2) GO TO 160
      IF(KA .EQ. 3) GO TO 165
      IF(XA .EQ. 4) GO TO 170
      IF(XA .EQ. 5) GO TO 175
      WRITE (6,25)
      MK = 1
      NX = 5
      GO TO 180
  160 WRITE (6,35)
      MX = 6
      NK = 10
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      GO TO 180
  165 WRITE (6,45)
      MK = 11
      NK = 15
      GO TO 180
  170 WRITE (6,55)
      MK = 16
      NK = 20
      GO TO 180
  175 WRITE (6,65)
      MK = 21
      NK = 25
  180 DO 185 I=1,NBK
      WRITE (6,75) I,(BFTH(I,J),J=MK,NK),SBM(KA,I)
  185 CONTINUE
      WRITE (6,85) (STBS(I),I=MK,NK),SBFR(KA)
  190 IF(KOUNT .LT. 3) GO TO 200
      SSUM = SBSV(KA) + SBH(KA) + SCR(KA) + SFR(KA) + SCN(KA) + SAHP(KA)
      IF(SSUM .EQ. 0.0) GO TO 500
      WRITE (6,5)
      KOUNT = 0
  200 IF(SBSV(KA) .EQ. 0.0) GO TO 240
      KOUNT = KOUNT + 1
      WRITE (6,205)
  205 FORMAT (1H0,//,44X,39HBD. FT. TO BE SALVAGED IN NEXT PERIOD)
      IF(KA .EQ. 2) GO TO 210
      IF(KA .EQ. 3) GO TO 215
      IF(KA .EQ. 4) GO TO 220
      IF(KA .EQ. 5) GO TO 225
      WRITE (6,25)
      MK = 1
      NK = 5
      GO TO 230
  210 WRITE (6,35)
      MK = 6
      NK = 10
      GO TO 230
  215 WRITE (6,45)
      MK = 11
      NK = 15
      GO TO 230
  220 WRITE (6,55)
      MK = 16
      NK = 20
      GO TO 230
  225 WRITE (6,65)
      MK = 21
      NK = 25
  230 DO 235 I=1,NBK
      WRITE (6,75) I,(SLVG(I,J),J=MK,NK),SSL(KA,I)
  235 CONTINUE
      WRITE (6,85) (STLV(I),I=MK,NK),SBSV(KA)
  240 IF(KOUNT .LT. 3) GO TO 250
      SSUM = SBH(KA) + SCR(KA) + SFR(KA) + SCN(KA) + SAHP(KA)
      IF(SSUM .EQ. 0.0) GO TO 500
      WRITE (6,5)
      KOUNT = 0
  250 IF(SBH(KA) .EQ. 0.0) GO TO 290
      KOUNT = KOUNT + 1
      WRITE (6,255)
  255 FORMAT (1H0,//,41X,46HBD. FT. TO BE HARVESTED BY REGENERATION CU
     1TS)
      IF(KA .EQ. 2) GO TO 260
      IF(KA .EQ. 3) GO TO 265
      IF(KA .EQ. 4) GO TO 270
      IF(KA .EQ. 5) GO TO 275
      WRITE (6,25)
      MK = 1
      NK = 5
      GO TO 280
  260 WRITE (6,35)
      MK = 6
      NK = 10
      GO TO 280
  265 WRITE (6,45)
      MK = 11
      NK = 15
      GO TO 280
  270 WRITE (6,55)
      MK = 16
      NK = 20
      GO TO 280
  275 WRITE (6,65)
      MK = 21
      NK = 25
  280 DO 285 I=1,NBK
      WRITE (6,75) I,(CUTA(I,J),J=MK,NK),SCA(KA,I)
  285 CONTINUE
      WRITE (6,85) (STHR(I),I=MK,NK),SBH(KA)
  290 IF(KOUNT .LT. 3) GO TO 300
      SSUM = SCR(KA) + SFR(KA) + SCN(KA) + SAHP(KA)
      IF(SSUM .EQ. 0.0) GO TO 500
      WRITE (6,5)
      KOUNT = 0
  300 IF(SCR(KA) .EQ. 0.0) GO TO 340
      KOUNT = KOUNT + 1
      WRITE (6,305)
  305 FORMAT (1H0,//,43X,42HHUNDREDS OF CU. FT. FROM REGENERATION CUTS)
      IF(KA .EQ. 2) GO TO 310
      IF(KA .EQ. 3) GO TO 315
      IF(KA .EQ. 4) GO TO 320
      IF(KA .EQ. 5) GO TO 325
      WRITE (6,25)
      MK = 1
      NK = 5
      GO TO 330
  310 WRITE (6,35)
      MK = 6
      NK = 10
      GO TO 330
  315 WRITE (6,45)
      MK = 11
      NK = 15
      GO TO 330
  320 WRITE (6,55)
      MK = 16
      NK = 20
      GO TO 330
  325 WRITE (6,65)
      MK = 21
      NK = 25
  330 DO 335 I=1,NBK
      WRITE (6,75) I,(PDCFR(I,J),J=MK,NK),SCRB(KA,I)
  335 CONTINUE
      WRITE (6,85) (SCRT(I),I=MK,NK),SCR(KA)
  340 IF(KOUNT .LT. 3) GO TO 350
      SSUM = SFR(KA) + SCN(KA) + SAHP(KA)
      IF(SSUM .EQ. 0.0) GO TO 500
      WRITE (6,5)
      KOUNT = 0
  350 IF(SFR(KA) .EQ. 0.0) GO TO 390
      KOUNT = KOUNT + 1
      WRITE (6,355)
  355 FORMAT (1H0,//,37X,54HBD. FT. TO BE HARVESTED BY FINAL REMOVAL O
     1F OVERWOOD)
      IF(KA .EQ. 2) GO TO 360
      IF(KA .EQ. 3) GO TO 365
      IF(KA .EQ. 4) GO TO 370
      IF(KA .EQ. 5) GO TO 375
      WRITE (6,25)
      MK = 1
      NK = 5
      GO TO 380
  360 WRITE (6,35)
      MK = 6
      NK = 10
      GO TO 380
  365 WRITE (6,45)
      MK = 11
      NK = 15
      GO TO 380
  370 WRITE (6,55)
      MK = 16
      NK = 20
      GO TO 380
  375 WRITE (6,65)
      MK = 21
      NK = 25
  380 DO 385 I=1,NBK
      WRITE (6,75) I,(CUTB(I,J),J=MK,NK),SCB(KA,I)
  385 CONTINUE
      WRITE (6,85) (STFO(I),I=MK,NK),SFR(KA)
  390 IF(KOUNT .LT. 3) GO TO 400
      SSUM = SCN(KA) + SAHP(KA)
      IF(SSUM .EQ. 0.0) GO TO 500
      WRITE (6,5)
      KOUNT = 0
  400 IF(SCN(KA) .EQ. 0.0) GO TO 440
      KOUNT = KOUNT + 1
      WRITE (6,405)
  405 FORMAT (1H0,//,46X,35HHUNDREDS OF CU. FT. FROM FINAL CUTS)
      IF(KA .EQ. 2) GO TO 410
      IF(KA .EQ. 3) GO TO 415
      IF(KA .EQ. 4) GO TO 420
      IF(KA .EQ. 5) GO TO 425
      WRITE (6,25)
      MK = 1
      NK = 5
      GO TO 430
  410 WRITE (6,35)
      MK = 6
      NK = 10
      GO TO 430
  415 WRITE (6,45)
      MK = 11
      NK = 15
      GO TO 430
  420 WRITE (6,55)
      MK = 16
      NK = 20
      GO TO 430
  425 WRITE (6,65)
      MK = 21
      NK = 25
  430 DO 435 I=1,NBK
      WRITE (6,75) I,(PDCFN(I,J),J=MK,NK),SCNB(KA,I)
  435 CONTINUE
      WRITE (6,85) (SCNT(I),I=MK,NK),SCN(KA)
  440 IF(KOUNT .LT. 3) GO TO 445
      SSUM = SAHP(KA)
      IF(SSUM .EQ. 0.0) GO TO 500
      WRITE (6,5)
      KOUNT = 0
  445 IF(SAHP(KA) .EQ. 0.0) GO TO 490
      WRITE (6,450)
  450 FORMAT (1H0,//,39X,50HACRES OF NONCOMMERCIAL THINNING DURING NEXT
     1PERIOD)
      IF(KA .EQ. 2) GO TO 460
      IF(KA .EQ. 3) GO TO 465
      IF(KA .EQ. 4) GO TO 470
      IF(KA .EQ. 5) GO TO 475
      WRITE (6,25)
      MK = 1
      NK = 5
      GO TO 480
  460 WRITE (6,35)
      MK = 6
      NK = 10
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      GO TO 480
  465 WRITE (6,45)
      MK = 11
      NK = 15
      GO TO 480
  470 WRITE (6,55)
      MK = 16
      NK = 20
      GO TO 480
  475 WRITE (6,65)
      MK = 21
      NK = 25
  480 OO 485 I=1,NBK
      WRITE (6,75) I,(HELP(I,J),J=MK,NK),SHL(KA,I)
  485 CONTINUE
      WRITE (6,85) (STHP(I),I=MK,NK),SAHP(KA)
  490 CONTINUE
  500 RETURN
      END
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Subroutine BHPP

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      SUBROUTINE BHPP
C
C LOCATION FOR ALL SPECIES - SPECIFIC STATEMENTS APPLICABLE TO BLACK
C HILLS PONOEROSA PINE.
C
      COMMON AOO,AGE(2),AGEO,BA(2),BAS(2),BASO,BAST,BAUS,BFMRCH,BFVOL,
     1CFVOL,OATE(6),OBH(2),OBHE,OBHO,DBHT,OEN(2),OENO,OENT,OMUS,FBA(2),
     2FCTR(2),FOM(2),FON(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSO,
     3HTST,KAK,KNO,MIN,MNK,NBK,NCMP,NSUB,NWGP,POBHE,PRET,PROO(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLANO,TBA(2),TDM(2),TEM,TIME,TMBR
     5,TMPO,TOT(2),TOTO,TOTT,TVL(2),VDM(2),VLUS,OMR(2)
      COMMON ABFAG(5,15),ACINT(5),AOJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BOMAI(5),BFAGE(5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),OBHTH(5,14),OELAY(5),DENTH(5,14),OLEV(5),FNBO(5),
     4FNCU(5),GROWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),OPBO(5),OPCU(5),PAIBO(5),PAICU(5),POOR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBF(5),SHELT(5,2,14),SHWD(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     8WGNUM(5),WGPOES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),OPEN(7,27),PBRSI(7,14),POCFN(7,27
     2),PDCFR(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLT(
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBO(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      COMMON /BLKO/ IJ,IK,KI,VOL,TVOL
C
      GO TO (10,20,30,40,50,60,70,80,90,100,110,120), IJ
C
C SECTION 1 - FINO TOTAL CUBIC FOOT VOLUME.
C
   10 O2H = OBH(IK) * OBH(IK) * HT(IK)
      IF(O2H .GT. 6000.0) GO TO 11
      TOT(IK) = (0.00225 * O2H - 0.00074 * BAS(IK) + 0.03711) * DEN(IK)
      GO TO 12
   11 TOT(IK) = (0.00247 * O2H + 0.00130 * BAS(IK) - 1.40286) * OEN(IK)
   12 RETURN
C
C SECTION 2 - VOLUME CONVERSION FACTORS.
C MERCH. CU. FT. - TREES 6.0 INCHES O.B.H. ANO LARGER TO 4-INCH TOP.
C BO. FT. - TREES 10.0 INCHES O.B.H. ANO LARGER TO B-INCH TOP.
C
   20 OO 21 J=1,2
      FCTR(J) = 0.0
   21 PROO(J) = 0.0
      OO 26 I=1,KNO
      IF(VOM(I) .LE. 4.99) GO TO 26
      IF(VOM(I) .GT. 6.7) GO TO 22
      FCTR(I) = 0.26612 * VOM(1) - 1.12689
      GO TO 24
   22 IF(VOM(1) .GT. 10.4) GO TO 23
      FCTR(I) = 3.46993 - 0.12017 * VDM(I) - 13.41984 / VOM(I)
      GO TO 24
   23 FCTR(I) = 0.99666 - 0.66932 / VOM(I)
   24 IF(VOM(I) .LE. 7.99) GO TO 26
      IF(VOM(I) .GT. 11.9) GO TO 25
      PROO(I) = 0.87783 * VOM(I) + 0.00660 * BA(I) - 7.27957
      GO TO 26
   25 PROO(1) = 5.10752 + 0.10712 * VOM(I) + 0.00185 * BA(I) - 36.20229
     1 / VOM(I)
   26 CONTINUE
      RETURN
C
C SECTION 3 - GROWTH FOR NEXT PERIOO.
C
   30 OO 35 I=1,2
      TMOY = AGE(I) + TIME
      IF(TMOY .LT. TEM) GO TO 35
      IF (HT(I).LE.0.) GO TO 31
      FOM(I) = 0.88511 * OBH(I) + 1.29735 * ALOG10(HT(I)) + 0.00119 * OB
     1H(I) * SITE + 62.37174 / SBAS - 1.56975
   31 IF(OBH(1) .GE. 10.0) GO TO 32
      FON(1) = 0.00247 + 0.00124 * OBH(I) + 0.00028 * OBH(I) * OBH(I) +
     10.00000521 * SBAS * SBAS - 0.0000905 * OBH(I) * SBAS
      IF(FON(I) .LT. 0.0) FON(1) = 0.0
      FON(I) = OEN(I) * (1.0 - FON(I))
      MNK = FON(1) + 0.5
      FON(I) = MNK
      GO TO 33
   32 FON(I) = OEN(I)
   33 FBA(I) = 0.0054542 * FOM(I) * FDM(1) * FON(I)
      FHT(I) = 15.43021 + 1.107 * HT(I) - 0.08637 * AGE(I) - 304.12172 /
     1SITE - 0.02447 * SITE * SBAS / 100.0
      O2H = FOM(I) * FOM(I) * FHT(I)
      IF(O2H .GT. 6000.0) GO TO 34
      FVL(I) = (0.00225 * D2H - 0.00074 * FBA(I) + 0.03711) * FON(I)
      GO TO 35
   34 FVL(I) = (0.00247 * O2H + 0.00130 * FBA(I) - 1.40286) * FON(I)
   35 CONTINUE
      RETURN
C
C SECTION 4 - FUTURE UNTHINNEO UNOERSTORY IF OVERSTORY REOUCEO NOW.
C
   40 OMUS = 0.88511 * OBH(2) + 1.29735 * ALOG10(HT(2)) + 0.00119 * OBH(
     12) * SITE + 62.37174 / BAS(2) - 1.56975
      IF(OBH(2) .GE. 10.0) GO TO 41
      ONUS = 0.00247 + 0.00124 * OBH(2) + 0.00028 * OBH(2) * OBH(2) + 0.
     100000521 * BAS(2) * BAS(2) - 0.0000905 * OBH(2) * BAS(2)
      IF(ONUS .LT. 0.0) ONUS = 0.0
      ONUS = OEN(2) * (1.0 - ONUS)
      MNK = ONUS + 0.5
      ONUS = MNK
      GO TO 42
   41 DNUS = OEN(2)
   42 BAUS = 0.0054542 * OMUS * OMUS * DNUS
      HTUS = 15.43021 + 1.107 * HT(2) - 0.08637 * AGE(2) - 304.12172 / S
     1ITE - 0.02447 * SITE * BAS(2) / 100.0
      O2H = OMUS * OMUS * HTUS
      IF(O2H .GT. 6000.0) GO TO 43
      VLUS = (0.00225 * O2H - 0.00074 * BAUS + 0.03711) * ONUS
      GO TO 44
   43 VLUS = (0.00247 * O2H + 0.00130 * BAUS - 1.40286) * ONUS
   44 RETURN
C
C SECTION 5 - NEW O.B.H. AFTER THINNING.
C
   50 IF(PRET .LT. 50.0) GO TO 51
      DBHE = 0.73365 + 1.02008 * DBHO - 0.01107 * (PRET - 50.0) - 0.0001
     14 * (PRET - 50.0) * (PRET - 50.0)
      GO TO 52
   51 POBHE = 0.49401 + 0.71890 * ALOG10(OBHO) - 0.22530 * ALOG10(PRET)
     1 + 0.12616 * ALOG10(DBHO) * ALOG10(PRET)
      OBHE = 10.0 ** PDBHE
   52 RETURN
C
C SECTION 6 - CUBIC FEET AS BYPROOUCT OF SAWLOG CUT.
C
   60 AOO = VOL * (0.6180 + 26.7798 / OBH(KI) - 0.04034 * VOL)
      AOO = TVOL - AOO
      IF(ADD .LT. COMCU(KAK)) AOO = 0.0
      RETURN
C
C SECTION 7 - VOLUME IF THINNED NOW ANO IF THINNED IN TIME YEARS.
C
   70 HT(KI) = HT(KI) + 7.64833 - 3.82286 * ALOG10(PRET)
      TEM = TBA(IK) / (0.0054542 * TOM(IK) * TDM(IK))
      O2H = TOM(IK) * TOM(IK)* HT(KI)
      IF(O2H .GT. 6000.0) GO TO 71
      TVL(IK) = (0.00225 * O2H - 0.00074 * TBA(IK) + 0.03711) * TEM
      GO TO 72
   71 TVL(IK) = (0.00247 * O2H + 0.00130 * TBA(IK) - 1.40286) * TEM
   72 RETURN
C
C SECTION 8 - STATUS AT END OF PERIOO IF THINNED AT START OF PERIOO.
C
   80 J = TIME / RINT(KAK)
      OO 83 I=1,J
      IF(TBA(1) .LE. 0.0) GO TO 83
      HT(1) = HT(1) + 7.64833 - 3.82286 * ALOG10(SAVE)
      FOM(1) = 1.0097*TOM(1)+0.0096*SITE-1.5766*ALOG10(TBA(1))+3.3021
      FHT(1) = 15.43021 + 1.107 * HT(1) - 0.08637 * AGE(KI) - 304.12172
     1/  SITE - 0.02447 * SITE * TBA(1) / 100.0
      MNK = (TBA(1) / (0.0054542 * TDM(1) * TOM(1))) + 0.5
      IF(TOM(1) .LT. 10.0) GO TO 81
      FON(1) = MNK
      GO TO 82
   81 FON(1) = 0.00247 + 0.00124 * TOM(1) + 0.00028 * TOM(1) * TOM(1) +
     10.00000521 * TBA(1) * TBA(1) - 0.0000905 * TOM(1) * TBA(1)
      IF(FON(1) .LT. 0.0) FON(1) = 0.0
      TEM = MNK
      NKM = TEM * (1.0 - FON(1)) + 0.5
      FON(1) = NKM
   82 FBA(1) = FON(1) * 0.0054542 * FOM(1) * FOM(1)
      TOM(1) = FOM(1)
      TBA(1) = FBA(1)
      HT(1) = FHT(1)
      AGE(KI) = AGE(KI) + RINT(KAK)
   83 CONTINUE
      O2H = FOM(1) * FOM(1) * FHT(1)
      IF(O2H .GT. 6000.0) GO TO 84
      FVL(1) = (0.00225 * D2H - 0.00074 * FBA(1) + 0.03711) * FON(1)
      GO TO 85
   84 FVL(1) = (0.00247 * O2H + 0.00130 * FBA(1) - 1.40286) * FON(1)
   85 RETURN
C
C SECTION 9 - HEIGHT ANO VOLUME BEFORE THINNING.
C
   90 IF(AGEO .GT. 55.0) GO TO 91
      HTSO = 0.01441 * AGEO * SITE - 0.12162 * AGEO - 1.50953
      GO TO 92
   91 HTSO = 0.59947 - 61.5019 / AGEO + 0.80522 * ALOG10(SITE) + 20.5252
     18 * ALOG10(SITE) / AGEO
      HTSO = 10.0 ** HTSO
   92 HTSO = HTSO + HTCUM
      O2H = OBHO * OBHO * HTSO
      IF(O2H .GT. 6000.0) GO TO 93
      TOTO = (0.00225 * D2H - 0.00074 * BASO + 0.03711) * OENO
      GO TO 94
   93 TOTO = (0.00247 * O2H + 0.00130 * BASO - 1.40286) * OENO
   94 RETURN
C
C SECTION 10 - HEIGHT AND TOTAL CUBIC FEET PER ACRE AFTER THINNING.
C
  100 AOOHT = 7.64833 - 3.82286 * ALOG10(PRET)
      HTCUM = HTCUM + AOOHT
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      HTST = HTSO + AOOHT
      O2H = DBHT * OBHT * HTST
      IF(O2H .GT. 6000.0) GO TO 101
      TOTT = (0.00225 * O2H - 0.00074 * BAST + 0.03711) * OENT
      GO TO 102
  101 TOTT = (0.00247 * O2H + 0.00130 * BAST - 1.40286) * DENT
  102 RETURN
C
C SECTION 11 - O.B.H. AT ENO OF PROJECTION PERIOO.
C
  110 OBHO = 1.0097*DBHT + 0.0096*SITE - 1.5766*ALOG10(BAST) + 3.3021
      RETURN
C
C SECTION 12 - MORTALITY AS A PERCENTAGE OF INITIAL OENSITY.
C
  120 OENO = 0.00247 + 0.00124 * OBHT + 0.00028 * OBHT * OBHT + 0.000005
     121 * BAST * BAST - 0.0000905 * DBHT * BAST
      RETURN
      END
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Subroutine LDGP

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      SUBROUTINE LDGP
C
C LOCATION FOR ALL SPECIES - SPECIFIC STATEMENTS APPLICABLE TO LOOGEPOLE
C PINE IN COLO. ANO WYO.
C
      COMMON AOO,AGE(2),AGEO,BA(2),BAS(2),BASO,BAST,BAUS,BFMRCH,BFVOL,
     1CFVOL,OATE(6),OBH(2),OBHE,DBHO,OBHT,OEN(2),DENO,OENT,OMUS,FBA(2),
     2FCTR(2),FOM(2),FON(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSO,
     3HTST,KAK,KNO,MIN,MNK,NBK,NCMP,NSJB,NWGP,POBHE,PRET,PROO(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLANO,TBA(2),TDM(2),TEM,TIME,TMBR
     5,TMPO,TOT(2),TOTO,TOTT,TVL(2),VOM(2),VLUS,DMR(2)
      COMMON ABFAG(5,15),ACINT(5),AOJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BOMAI(5),BFAGE(5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),COMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),OBHTH(5,14),OELAY(5),OENTH(5,14),OLEV(5),FNBO(5),
     4FNCU(5),GROWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NS((5),OPBO(5),OPCU(5),PAIBO(5),PAICU(5),POOR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBF(5),SHELT(5,2,14),SHWO(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     BWGNUM(5),WGPDES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),OPEN(7,27),PBRSI(7,14),POCFN(7,27
     2),POCFR(7,27),PSPLT(7,27),PUNC(7,27),SARETY(7,35),SLVG(7,27),SPLT(
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBO(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      COMMON /BLKO/ IJ,IK,KI,VOL,TVOL
C
      GO TO (10,20,30,40,50,60,70,80,90,100,110,120), IJ
C
C SECTION 1 - TOTAL CUBIC FOOT VOLUME.
C
   10 O2H = DBH(IK) * OBH(IK) * HT(IK)
      IF(O2H .GT. 7000.0) GO TO 11
      TOT(IK) = (-0.00577 - 0.00059 * BAS(IK) + 0.00276 * O2H) * DEN(IK)
      GO TO 12
   11 TOT(IK) = (0.00248 * O2H + 1.96336) * OEN(IK)
   12 RETURN
C
C SECTION 2 - VOLUME CONVERSION FACTORS.
C MERCH. CU. FT. - TREES 6.0 INCHES O.B.H. ANO LARGER TO 4-INCH TOP.
C BO. FT. - TREES 6.5 INCHES D.B.H. ANO LARGER TO 6-INCH TOP.
C
   20 DO 21 J=1,2
      FCTR(J) = 0.0
   21 PROD(J) = 0.0
      DO 26 I=1,KNO
      IF(VOM(I) .LE. 4.99) GO TO 26
      IF(VOM(I) .GT. 6.7) GO TO 22
      FCTR(I) = 0.31963 * VOM(I) - 1.42291
      GO TO 24
   22 IF(VOM(I) .GT. 9.8) GO TO 23
      FCTR(I) = 3.68255 - 0.14007 * VOM(I) - 13.54644 / VOM(I)
      GO TO 24
   23 FCTR(I) = 0.99503 - 0.58018 / VDM(I)
   24 IF(VOM(I) .LE. 7.99) GO TO 26
      IF(VOM(I) .GT. 10.0) GO TO 25
      PROO(I) = 0.00045 * BA(I) + 0.18091 * VOM(I) + 2.08874
      GO TO 26
   25 PROO(I) = 0.16583 + 3.74174 * ALOG10(VDM(I))
   26 CONTINUE
      RETURN
C
C SECTION 3 - GROWTH FOR NEXT PERIOO.
C
   30 DO 35 I=1,2
      TMDY = AGE(I) + TIME
      IF(TMOY .LT. TEM) GO TO 35
      IF(HT(I) .LE. 0.0) GO TO 31
      FDM(I) = 0.2631 + 0.95287 * DBH(I) + 0.0016 * DBH(I) * SITE + 16.4
     16662 / SBAS
      IF(DMR(I) .LE. 3.9) GO TO 31
      TEM = (FDM(I) - DBH(I)) * (1.0 - (0.192 * OMR(I) - 0.754))
      FDM(I) = OBH(I) + TEM
   31 DIE = 0.0
      IF(DEN(I) .GT. 1000.0) GO TO 32
      DIE = (3.81 * DMR(I) - 6.63) * 0.01
      IF(DIE .LT. 0.0) DIE = 0.0
      GO TO 33
   32 DIE = (8.64 + 3.28 * OMR(I)) * 0.01
   33 FON(I) = 0.0
      IF(OBH(I) .GE. 10.0) GO TO 34
      FON(I) = 0.05285 - 0.01346 * OBH(I) + 0.00226 * DBH(I) * OBH(I) +
     10.0000066 * SBAS * SBAS - 0.0001931 * DBH(I) * SBAS
      IF(FON(I) .LT. 0.0) FDN(I) = 0.0
   34 IF(DIE .LT. FON(I)) DIE = FDN(I)
      FDN(I) = DEN(I) * (1.0 - DIE)
      MNK = FDN(I) + 0.5
      FON(I) = MNK
      FBA(I) = 0.0054542 * FOM(I) * FDM(I) * FDN(I)
      FHT(I) = 14.57349 + 1.101 * HT(I) - 0.09654 * AGE(I) - 333.37172 /
     1SITE - 0.04321 * SITE * SBAS / 100.0
      PCT = 1.0 - 0.0028 * DMR(I) * OMR(I) * OMR(I)
      CHNG = (FHT(I) - HT(I)) * PCT
      FHT(I) = HT(I) + CHNG
      D2H = FOM(I) * FOM(I) * FHT(I)
      IF(D2H .GT. 7000.0) GO TO 35
      FVL(I) = (0.00276 * D2H - 0.00059 * FBA(I) - 0.00577) * FON(I)
      GO TO 36
   35 FVL(I) = (0.00248 * D2H + 1.96336) * FDN(I)
   36 CONTINUE
      RETURN
C
C SECTION 4 - FUTURE UNTHINNEO UNOERSTORY IF OVERSTORY REOUCEO NOW.
C
   40 OMUS = 0.2631 + 0.95287 * DBH(2) + 0.0016 * DBH(2) * SITE + 16.466
     162 / BAS(2)
      IF(DMR(2) .LE. 3.9) GO TO 41
      TEM = (DMUS - OBH(2)) * (1.0 - (0.192 * DMR(2) - 0.754))
      OMUS = DBH(2) + TEM
   41 OIE = 0.0
      IF(DEN(2) .GT. 1000.0) GO TO 42
      OIE = (3.81 * OMR(2) - 6.63) * 0.01
      IF(DIE .LT. 0.0) OIE = 0.0
      GO TO 43
   42 OIE = (8.64 + 3.28 * OMR(2)) * 0.01
   43 ONUS = 0.0
      IF(DBH(2) .GE. 10.0) GO TO 44
      ONUS = 0.05285 - 0.01346 * OBH(2) + 0.00226 * OBH(2) * O8H(2) + 0.
     10000066 * BAS(2) * BAS(2) - 0.0001931 * DBH(2) * BAS(2)
      IF(DNUS .LT. 0.0) DNUS = 0.0
   44 IF(DIE .LT. ONUS) DIE = ONUS
      DNUS = OEN(2) * (1.0 - ONUS)
      MNK = DNUS + 0.5
      ONUS = MNK
      BAUS = 0.0054542 * OMUS * OMUS * DNUS
      HTUS = 14.57349 + 1.101 * HT(2) - 0.09654 * AGE(2) - 333.37172 / S
     1ITE - 0.04321 * SITE * BAS(2) / 100.0
      PCT = 1.0 - 0.0028 * OMR(2) * OMR(2) * OMR(2)
      CHNG = (HTUS - HT(2)) * PCT
      HTUS = HT(2) + CHNG
      D2H = OMUS * OMUS * HTUS
      IF(D2H .GT. 7000.0) GO TO 45
      VLUS = (0.00276 * D2H - 0.00059 * BAUS - 0.00577) * ONUS
      GO TO 46
   45 VLUS = (0.00248 * O2H + 1.96336) * DNUS
   46 RETURN
C
C SECTION 5 - NEW O.B.H. AFTER THINNING.
C
   50 IF(PRET .LT. 50.0) GO TO 51
      DBHE = 0.44222 + 1.03170 * DBHO - 0.00816 * (PRET - 50.0) - 0.0000
     19 * (PRET - 50.0) * (PRET - 50.0)
      GO TO 52
   51 POBHE = 0.37321 - 0.17274 * ALOG10(PRET) + 0.79921 * ALOG10(OBHD)
     1+ 0.09315 * ALOG10(PRET) * ALOG10(OBHD)
      DBHE = 10.0 ** POBHE
   52 RETURN
C
C SECTION 6 - CUBIC FEET AS BYPROOUCT OF SAWLOG CUT.
C
   60 AOO = VOL * (2.09342 + 2.98062 / OBH(KI) - 0.00542 * VOL)
      ADD = TVOL - AOO
      IF(AOO .LT. CDMCU(KAK)) ADO = 0.0
      RETURN
C
C SECTION 7 - VOLUME IF THINNEO NOW ANO IF THINNEO IN TIME YEARS.
C
   70 HT(KI) = HT(KI) + 6.79950 - 3.41979 * ALOG10(PRET)
      TEM = TBA(IK) / (0.0054542 * TDM(IK) * TOM(IK))
      D2H = TDM(IK) * TDM(IK) * HT(KI)
      IF(O2H .GT. 7000.0) GO TO 71
      TVL(IK) = (0.00276 * O2H - 0.00059 * TBA(IK) - 0.00577) * TEM
      GO TO 72
   71 TVL(IK) = (0.00248 * O2H + 1.96336) * TEM
   72 RETURN
C
C SECTION 8 - STATUS AT END OF PERIDO IF THINNED AT START OF PERIOD.
C
   80 J = TIME / RINT(KAK)
      DO 85 I=1,J
      IF(TBA(1) .LE. 0.0) GO TO 85
      HT(1) = HT(1) + 6.79950 - 3.41979 * ALOG10(SAVE)
      FOM(1) = 1.0222 * TOM(1) + 0.0151 * SITE - 1.2417 * ALOG10(TBA(1))
     1 + 2.1450
      IF(OMR(1) .LE. 3.9) GO TO 81
      TEM = (FDM(1) - TOM(1)) * (1.0 - (0.192 * OMR(1) - 0.754))
      FOM(1) = TDM(1) + TEM
   81 FHT(1) = 14.57349 + 1.101 * HT(1) - 0.09654 * AGE(KI) - 333.37172
     1/ SITE - 0.04321 * SITE * TBA(1) / 100.0
      PCT = 1.0 - 0.0028 * DMR(1) * DMR(1) * DMR(1)
      CHNG = (FHT(1) - HT(1)) * PCT
      FHT(1) = HT(1) + CHNG
      OIE = 0.0
      ITEM = TBA(1) / (0.0054542 * TOM(1) * TOM(1)) + 0.5
      TEM = ITEM
      IF(TEM .GT. 1000.0) GO TO 82
      OIE = (3.81 * OMR(1) - 6.63) * 0.01
      IF(DIE .LT. 0.0) OIE = 0.0
      GO TO 83
   82 DIE = (8.64 + 3.28 * OMR(1)) * 0.01
   83 FDN(1) = 0.0
      ITRE = (TBA(I) / (0.0054542 * TOM(1) * TDM(1))) + 0.5
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```
      TRE = ITRE
      IF(TDM(1) .GE. 10.0) GO TO 84
      FON(1) = 0.05285 - 0.01346 * TOM(1) + 0.00226 * TOM(1) * TOM(1) +
     10.0000066 * TBA(1) * TBA(1) - 0.0001931 * TOM(1) * TBA(1)
      IF(FON(1) .LT. 0.0) FON(1) = 0.0
   84 IF(DIE .LT. FON(1)) DIE = FON(1)
      FON(1) = TRE * (1.0 - DIE)
      MNK = FON(1) + 0.5
      FON(1) = MNK
      FBA(1) = FON(1) * 0.0054542 * FOM(1) * FOM(1)
      TDM(1) = FOM(1)
      TBA(1) = FBA(1)
      HT(1) = FHT(1)
      AGE(KI)  = AGE(KI) + RINT(KAK)
   85 CONTINUE
      D2H = FOM(1) * FOM(1) * FHT(1)
      IF(D2H .GT. 7000.0) GO TO 86
      FVL(1) = (0.00276 * D2H - 0.00059 * FBA(1) - 0.00577) * FON(1)
      GO TO 87
   86 FVL(1) = (0.00248 * D2H + 1.96336) * FON(1)
   87 RETURN
C
C SECTION 9 - HEIGHT AND VOLUME BEFORE THINNING.
C
   90 IF(AGED .GT. 45.0) GO TO 91
      HTSD = 3.86111 - 0.05979 * AGED + 0.01215 * AGED * SITE
      GO TO 92
   91 HTSD = 0.33401 - 33.2866 / AGED + 0.92341 * ALOG10(SITE) + 6.27811
     1* ALOG10(SITE) / AGED
      HTSD = 10.0 ** HTSD
   92 HTSD = HTSD + HTCUM
      D2H = DBHD * DBHD * HTSD
      IF(D2H .GT. 7000.0) GO TO 93
      TOTD = (0.00276 * D2H - 0.00059 * BASD - 0.00577) * DEND
      GO TO 94
   93 TOTD = (0.00248 * D2H + 1.96336) * DEND
   94 RETURN
C
C SECTION 10 - HEIGHT AND TOTAL CUBIC FEET PER ACRE AFTER THINNING.
C
  100 ADDHT = 6.7995 - 3.41979 * ALOG10(PRET)
      HTCUM = HTCUM + ADDHT
      HTST = HTSD + ADDHT
      D2H = DBHT * DBHT * HTST
      IF(D2H .GT. 7000.0) GO TO 101
      TOTT = (0.00276 * D2H - 0.00059 * BAST - 0.00577) * DENT
      GO TO 102
  101 TOTT = (0.00248 * D2H + 1.96336) * DENT
  102 RETURN
C
C SECTION 11 - D.B.H. AT END OF PROJECTION PERIOD.
C
  110 DBHD = 1.0222*DBHT + 0.0151*SITE - 1.2417*ALOG10(BAST) + 2.1450
      RETURN
C
C SECTION 12 - MORTALITY AS A PERCENTAGE OF INITIAL DENSITY.
C
  120 DEND = 0.05285 - 0.01346 * DBHT + 0.00226 * DBHT * DBHT + 0.000006
     16 * BAST * BAST - 0.0001931 * DBHT * BAST
      RETURN
      END
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Subroutine SWPP

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      SUBROUTINE SWPP
C
C LOCATION FOR ALL SPECIES - SPECIFIC STATEMENTS APPLICABLE TO PONDEROSA
C PINE IN ARIZONA AND NEW MEXICO.
C
      COMMON ADD,AGE(2),AGED,BA(2),BAS(2),BASD,BAST,BAUS,BFMRCH,BFVOL,
     1CFVOL,DATE(6),DBH(2),DBHE,DBHD,DBHT,DEN(2),DEND,DENT,DMUS,FBA(2),
     2FCTR(2),FOM(2),FON(2),FHT(2),FORET(19),FVL(2),HT(2),HTCUM,HTSD,
     3HTST,KAK,KND,MIN,MNK,NBK,NCMP,NSUB,NWGP,PDBHE,PRET,PROD(2),REST,
     4SAVE,SBARB,SBARE,SBARG,SBAS,SITE,SLAND,TBA(2),TOM(2),TEM,TIME,TMBR
     5,TMPD,TOT(2),TOTD,TOTT,TVL(2),VOM(2),VLUS,OMR(2)
      COMMON ABFAG(5,15),ACINT(5),ADJ(5),AGETH(5,14),ALLCF(5,14),ALOWC(5
     1),ALWBF(5),AMCAG(5,15),ANCUT(5,14),AREA(5,14),BDMAI(5),BFAGE(5,15)
     2,BFINT(5),CFAGE(5,15),CFBF(5,14),CDMBF(5),COMCU(5),CUCY(5),CUINT(5
     3),CUMAI(5),DBHTH(5,14),DELAY(5),DENTH(5,14),DLEV(5),FNBD(5),
     4FNCU(5),GROWB(5,2,14),GROWC(5,2,14),GVLBF(5),GVLCU(5),INVL(5,3,14)
     5,NSI(5),OPBD(5),DPCU(5),PAIBD(5),PAICU(5),POOR(5),REGN(5,3,14),
     6RINT(5),SARSP(5),SBF(5),SHELT(5,2,14),SHWD(5,2,14),SMC(5),SMSP(5),
     7SUBBF(5,14),SUBCF(5,14),SUMCF(5),SYST(5),THIN(5),VLLV(5,3,14),
     8WGNUM(5),WGPDES(5,20),WGPNM(5,3),SPNUM(5),TPB(5,7),PASP(5,7)
      COMMON ACBAR(7),ARBK(7),BARSI(7,14),BFTH(7,27),CMTH(7,27),CUTA(7,2
     17),CUTB(7,27),HELP(7,27),NSBK(7),OPEN(7,27),PBRSI(7,14),POCFN(7,27
     2),PDCFR(7,27),PSPLT(7,27),PUNC(7,27),SAFETY(7,35),SLVG(7,27),SPLT(
     37,27),TMTY(7),UNCML(7,27),PABR(7),PARTY(7,35)
      COMMON ACFNL(5,7,15),ACRGN(5,7,15),ACSI(5,7,14),ACSP(5,7),GRBD(5,7
     1,15),GRMC(5,7,15),PS(5,7,14),STYP(35),TYPNM(35,5),PASI(5,7,14)
C
      COMMON /BLKD/ IJ,IK,KI,VOL,TVOL
C
      GO TO (10,20,30,40,50,60,70,80,90,100,110,120), IJ
C
C SECTION 1 - TOTAL CUBIC FOOT VOLUME.
C
   10 D2H = DBH(IK) * DBH(IK) * HT(IK)
      IF(D2H .GT. 5000.0) GO TO 11
      TOT(IK) = (0.53313 + 0.00033 * BAS(IK) + 0.00179 * D2H) * DEN(IK)
      GO TO 12
   11 TOT(IK) = (0.00237 * BAS(IK) + 0.00211 * D2H - 1.09356) * DEN(IK)
   12 RETURN
C
C SECTION 2 - VOLUME CONVERSION FACTORS.
C MERCH. CU. FT. - TREES 6.0 INCHES D.B.H. AND LARGER TO 4-INCH TOP.
C BD. FT. - TREES 10.0 INCHES D.B.H. AND LARGER TO VARIABLE TOP LIMIT.
C
   20 DO 21 J=1,2
      FCTR(J) = 0.0
   21 PROD(J) = 0.0
      DO 26 I=1,KND
      IF(VOM(I) .LE. 4.99) GO TO 26
      IF(VOM(I) .GT. 6.5) GO TO 22
      FCTR(I) = 0.25222 * VOM(I) - 1.01119
      GO TO 24
   22 IF(VOM(I) .GT. 10.0) GO TO 23
      FCTR(I) = 3.02485 - 0.09957 * VOM(I) - 11.35814 / VOM(I)
      GO TO 24
   23 FCTR(I) = 1.03936 - 1.41034 / VOM(I)
   24 IF(VOM(I) .LE. 7.99) GO TO 26
      IF(VOM(I) .GT. 11.5) GO TO 25
      PROD(I) = 0.0028 * BA(I) + 0.04355 * VOM(I) * VOM(I) - 2.78326
      GO TO 26
   25 PROD(I) = 0.83943 + 0.20531 * VOM(I)
   26 CONTINUE
      RETURN
C
C SECTION 3 - GROWTH FOR NEXT PERIOD.
C
   30 DO 35 I=1,2
      TMOY = AGE(I) + TIME
      IF(TMOY .LT. TEM) GO TO 35
      IF(HT(I) .LE. 0.0) GO TO 31
      FOM(I) = 0.88511 * DBH(I) + 1.29735 * ALOG10(HT(I)) + 0.00119 *
     1DBH(I) * SITE + 62.37174 / SBAS - 1.56975
      IF(OMR(I) .LE. 3.5) GO TO 31
      TEM = (FOM(I) - DBH(I)) * (1.0 - (0.056 * OMR(I) - 0.197))
      FOM(I) = DBH(I) + TEM
   31 DIE = 0.0
      IF(OMR(I) .LT. 1.0) GO TO 32
      DIE = 20.66469 + 4.42271 * OMR(I) - 0.36374 * SITE + 3.87613 *
     1ALOG10(DEN(I))
      DIE = DIE * 0.01
      IF(DIE .LT. 0.0) DIE = 0.0
   32 FON(I) = 0.0
      IF(DBH(I) .GE. 10.0) GO TO 33
      FON(I) = 0.00247 + 0.00124 * DBH(I) + 0.00028 * DBH(I) * DBH(I) +
     10.00000521 * SBAS * SBAS - 0.0000905 * DBH(I) * SBAS
      IF(FON(I) .LT. 0.0) FON(I) = 0.0
   33 IF(DIE .LT. FON(I)) DIE = FON(I)
      FON(I) = DEN(I) * (1.0 - DIE)
      MNK = FON(I) + 0.5
      FON(I) = MNK
      FBA(I) = 0.0054542 * FOM(I) * FOM(I) * FON(I)
      FHT(I) = 15.43021 + 1.107 * HT(I) - 0.08637 * AGE(I) - 304.12172 /
     1SITE - 0.02447 * SITE * SBAS / 100.0
      PCT = 1.0 - 0.0002 * OMR(I) * OMR(I) * OMR(I)
      CHNG = (FHT(I) - HT(I)) * PCT
      FHT(I) = HT(I) + CHNG
      D2H = FOM(I) * FOM(I) * FHT(I)
      IF(D2H .GT. 5000.0) GO TO 34
      FVL(I) = (0.53313 + 0.00033 * FBA(I) + 0.00179 * D2H) * FON(I)
      GO TO 35
   34 FVL(I) = (0.00237 * FBA(I) + 0.00211 * D2H - 1.09356) * FON(I)
   35 CONTINUE
      RETURN
C
C SECTION 4 - FUTURE UNTHINNED UNDERSTORY IF OVERSTORY REDUCED NOW.
C
   40 DMUS = 0.88511 * DBH(2) + 1.29735 * ALOG10(HT(2)) + 0.00119 * DBH(
     12) * SITE + 62.37174 / BAS(2) - 1.56975
      IF(OMR(2) .LE. 3.5) GO TO 41
      TEM = (DMUS - DBH(2)) * (1.0 - (0.056 * OMR(2) - 0.197))
      DMUS = DBH(2) + TEM
   41 DIE = 0.0
      IF(OMR(2) .LT. 1.0) GO TO 42
      DIE = 20.66469 + 4.42271 * OMR(2) - 0.36374 * SITE + 3.87613 *
     1ALOG10(DEN(2))
      DIE = DIE * 0.01
      IF(DIE .LT. 0.0) DIE = 0.0
   42 DNUS = 0.0
      IF(DBH(2) .GE. 10.0) GO TO 43
      DNUS = 0.00247 + 0.00124 * DBH(2) + 0.00028 * DBH(2) * DBH(2) +
     10.00000521 * BAS(2) * BAS(2) - 0.0000905 * DBH(2) * BAS(2)
      IF(DNUS .LT. 0.0) DNUS = 0.0
   43 IF(DIE .LT. DNUS) DIE = DNUS
      DNUS = DEN(2) * (1.0 - DNUS)
      MNK = DNUS + 0.5
      DNUS = MNK
      BAUS = 0.0054542 * DMUS * DMUS * DNUS
      HTUS = 15.43021 + 1.107 * HT(2) - 0.08637 * AGE(2) - 304.12172 /
     1SITE - 0.02447 * SITE * BAS(2) / 100.0
      PCT = 1.0 - 0.0002 * OMR(2) * OMR(2) * OMR(2)
      CHNG = (HTUS - HT(2)) * PCT
      HTUS = HT(2) + CHNG
      D2H = DMUS * DMUS * HTUS
      IF(D2H .GT. 5000.0) GO TO 44
      VLUS = (0.53313 + 0.00033 * BAUS + 0.00179 * D2H) * DNUS
      GO TO 45
   44 VLUS = (0.00237 * BAUS + 0.00211 * D2H - 1.09356) * DNUS
   45 RETURN
C
C SECTION 5 - NEW D.B.H. AFTER THINNING.
C
   50 IF(PRET .LT. 50.0) GO TO 51
      DBHE = 0.73365 + 1.02008 * DBHD - 0.01107 * (PRET - 50.0) - 0.0001
     14 * (PRET - 50.0) * (PRET - 50.0)
      GO TO 52
   51 PDBHE = 0.49401 + 0.71890 * ALOG10(DBHD) - 0.22530 * ALOG10(PRET)
     1 + 0.12616 * ALOG10(DBHD) * ALOG10(PRET)
      DBHE = 10.0 ** PDBHE
   52 RETURN
C
C SECTION 6 - CUBIC FEET AS BYPRODUCT OF SAWLOG CUT.
C
```

```
   60 ADD = VDL * (1.40315 + 10.24272 / DBH(KI))
      ADD = TVOL - ADD
      IF(ADD .LT. CDMCU(KAK)) ADD = 0.0
      RETURN
C
C SECTION 7 - VOLUME IF THINNED NOW AND IF THINNED IN TIME YEARS.
C
   70 HT(KI) = HT(KI) + 7.64833 - 3.82286 * ALDG10(PRET)
      TEM = TBA(IK) / (0.0054542 * TDM(IK) * TDM(IK))
      D2H = TOM(IK) * TDM(IK) * HT(KI)
      IF(02H .GT. 500D.0) GO TD 71
      TVL(IK) = (0.53313 + D.00033 * TBA(IK) + D.00179 * D2H) * TEM
      GD TO 72
   71 TVL(IK) = (0.00237 * TBA(1K) + 0.00211 * D2H - 1.09356) * TEM
   72 RETURN
C
C SECTION 8 - STATUS AT END OF PERIDD IF THINNED AT START OF PERIDD.
C
   8D J = TIME / RINT(KAK)
      DO 84 I=1,J
      IF(TBA(1) .LE. 0.0) GD TO 84
      HT(1) = HT(1) + 7.64833 - 3.82286 * ALDG1D(SAVE)
      FDM(1) = 1.0097 * TOM(1) + 0.0096 * SITE - 1.5766 * ALDG1D(TBA(1))
     1 + 3.3021
      IF(OMR(1) .LE. 3.5) GD TD 81
      TEM = (FDM(1) - TDM(1)) * (1.0 - (0.056 * OMR(1) - 0.197))
      FDM(1) = TDM(1) + TEM
   81 FHT(1) = 15.43021 + 1.107 * HT(1) - 0.08637 * AGE(KI) - 3D4.12172
     I / SITE - 0.02447 * SITE * TBA(1) / 10D.0
      PCT = 1.0 - D.0002 * DMR(1) * OMR(1) * DMR(1)
      CHNG = (FHT(1) - HT(1)) * PCT
      FHT(1) = HT(1) + CHNG
      DIE = 0.0
      IF(OMR(1) .LT. 1.0) GO TO 82
      ITEM = TBA(1) / (D.0054542 * TDM(1) * TOM(1)) + 0.5
      TEM = ITEM
      DIE = 20.66469 + 4.42271 * DMR(1) - 0.36374 * SITE + 3.87613 *
     1ALDG10(TEM)
      DIE = DIE * 0.01
      IF(DIE .LT. 0.0) DIE = 0.0
   82 FDN(1) = 0.0
      ITRE = (TBA(1) / (0.0054542 * TOM(1) * TDM(1))) + D.5
      TRE = ITRE
      IF(TOM(1) .GE. 10.0) GD TO 83
      FDN(1) = 0.00247 + D.00124 * TDM(1) + D.00028 * TDM(1) * TDM(1) +
     1D.00000521 * TBA(1) * TBA(1) - 0.0000905 * TDM(1) * TBA(1)
      IF(FDN(1) .LT. 0.0) FDN(1) = D.0
   83 IF(DIE .LT. FON(1)) DIE = FDN(1)
      FDN(1) = TRE * (1.0 - DIE)
      MNK = FON(1) + 0.5
      FDN(1) = MNK
      FBA(1) = FDN(1) * 0.0054542 * FDM(1) * FDM(1)
```

```
      TDM(1) = FDM(1)
      TBA(1) = FBA(1)
      HT(1) = FHT(1)
      AGE(KI) = AGE(KI) + RINT(KAK)
   84 CONTINUE
      D2H = FDM(1) * FDM(1) * FHT(1)
      IF(D2H .GT. 5000.0) GD TD 85
      FVL(1) = (0.53313 + 0.00033 * FBA(1) + D.DD179 * D2H) * FDN(1)
      GO TD 86
   85 FVL(1) = (0.00237 * FBA(1) + 0.00211 * D2H - 1.09356) * FON(1)
   86 RETURN
C
C SECTION 9 - HEIGHT AND VOLUME BEFORE THINNING.
C
   90 IF(AGED .GT. 55.0) GD TD 91
      HTSO = 0.01441 * AGEO * SITE - 0.12162 * AGEO - 1.50953
      GD TO 92
   91 HTSO = 0.59947 - 61.5019 / AGED + 0.80522 * ALOG10(SITE) + 20.5252
     1B * ALOG10(SITE) / AGEO
      HTSO = 10.D ** HTSD
   92 HTSO = HTSD + HTCUM
      D2H = DBHD * DBHD * HTSO
      IF(D2H .GT. 5000.0) GD TO 93
      TOTD = (0.53313 + 0.0D033 * BASD + 0.00179 * D2H) * OEND
      GD TD 94
   93 TOTD = (0.00237 * BASD + 0.0C211 * D2H - 1.09356) * DEND
   94 RETURN
C
C SECTION 10 - HEIGHT AND TOTAL CUBIC FEET PER ACRE AFTER THINNING.
C
  10D ADOHT = 7.64833 - 3.82286 * ALOG1D(PRET)
      HTCUM = HTCUM + ADDHT
      HTST = HTSO + ADDHT
      D2H = DBHT * DBHT * HTST
      IF(02H .GT. 5DDD.0) GD TD 1D1
      TDTT = (0.53313 + 0.00033 * BAST + 0.00179 * D2H) * DENT
      GO TD 1D2
  101 TDTT = (0.00237 * BAST + 0.00211 * D2H - 1.09356) * DENT
  1D2 RETURN
C
C SECTION 11 - D.B.H. AT END OF PROJECTION PERIDD.
C
  11D OBHD = 1.0097*OBHT + 0.0096*SITE - 1.5766*ALDG10(BAST) + 3.3021
      RETURN
C
C SECTION 12 - MORTALITY AS A PERCENTAGE OF INITIAL DENSITY.
C
  120 DEND = 0.00247 + 0.00124 * OBHT + 0.00028 * DBHT * DBHT + 0.000005
     121 * BAST * BAST - 0.0000905 * DBHT * BAST
      RETURN
      END
```

APPENDIX 2

An Application of TEVAP2

An example of what TEVAP2 can do is provided by the hypothetical situation described below and by reproductions of the computer records produced. The test forest, the mythical Bogus National Forest, is managed as one working circle. The working circle is subdivided into three blocks on the basis of topography, transportation system, and distribution of wood-using plants. Total areas of each block, interior tracts of other ownership, high-use recreation areas, and so forth, are known. The forest has not yet been subdivided into compartments; the AREA2 option of TEVAP2 is applicable.

Numerous decisions have been made concerning management objectives and how they may be attained. Past records of the forest and silvicultural characteristics of each species were considered during the planning process. Decisionmaking was assisted by computer simulation of forest activities (Myers 1973). The effects of changes in rotation length and other variables subject to control were examined. It was decided that the controls listed below would apply to timber management on the working circle. These controls are not recommendations for management of the species named; they are intended only to show the variability possible with TEVAP2. Controls applicable to any specific area and management objectives can be determined (Myers 1971, Myers 1973).

Working groups.

a. Ponderosa 1—Ponderosa pine under two-cut shelterwood in remote areas of the forest.

b. Ponderosa 2—Ponderosa pine under three-cut shelterwood where recreation use is heavy.

c. Lodgepole—Lodgepole pine clearcut in small patches with natural regeneration from serotinous cones.

Rotations.

a. Ponderosa 1—110 years, with final felling age of 130 years.

b. Ponderosa 2—110 years, with final felling age of 140 years, for all sites except that site 40 will be 90 years with final felling age of 120 years.

c. Lodgepole—120 years.

Thinning.

a. Ponderosa 1—Initial thinning at age 30 to level 120. Subsequent thinnings at 20-year intervals to level 100.

b. Ponderosa 2—Initial thinning at age 30 to level 110. Subsequent thinnings at 20-year intervals to level 90.

c. Lodgepole—Initial thinning at age 30 to level 110. Subsequent thinnings at 30-year intervals to level 100.

Minimum site class to be managed for wood products.

a. Ponderosa 1—Site index 50.

b. Ponderosa 2—Site index 40.

c. Lodgepole—Site index 50.

Several decisions provided as inputs to the program are recorded on page type 4 of the output reproduced below. Other input data are recorded on pages of types 1, 8, and 11.

An inventory of the timber resource and analysis of the data were completed 5 years ago. At that time, summary cards with the items specified for data card type 9 were punched. The inventory file has increased annually through addition of records that describe thinning jobs, fires, and other changes affecting tracts of known area. The inventory file now consists of 251 records, 104 of which are job and similar reports; 147 sample "unknown" parts of the working circle. All inventory records are updated to a common time base annually (appendix 4).

Land books and other records provide the total number of acres in each block and the area occupied by nonforest vegetative and use types 28 to 33, inclusive. These acreages are recorded on pages type 5 and 6 of the output.

The situation described requires that data cards of all types except 11 through 16 be used.

Output pages reproduced below are in the order in which they might appear in a management plan, not in the order printed. For brevity, only two sheets each of pages type 8, 9, and 10 are reproduced. Complete output would include several sheets of each of these types, one for each site index class of each working group. Examples of pages produced with the other area options and with card types 11 through 16 appear in appendix 3.

A management guide can be produced annually, or more frequently, for distribution to appropriate land managers and staff. The example below required 91.0 seconds of central processor time for compilation and execution. After converting the source program to a binary deck, central processor time was 16.2 seconds for execution. The vast saving of time and money over conventional methods of plan preparation certainly should permit a timber manager to have an updated management plan whenever he wants one.

PAGE TYPE 1

GUIDE FOR MANAGEMENT BOGUS NATIONAL FOREST

BASED ON DATA CURRENT TO JANUARY 1, 1974

THE WORKING CIRCLE CONSISTS OF 884981.1 ACRES. OF THESE, 837181.7 ACRES ARE OWNED BY U.S. AND 47799.4 ACRES ARE INTERIOR TRACTS OF OTHER OWNERSHIP. OUR AREA INCLUDES 693717.3 TIMBERED ACRES, 110838.2 PLANTABLE ACRES, 16397.6 ACRES MANAGED AS RANGE, AND 6911.1 ACRES OF HIGH RECREATION USE WHERE TIMBER YIELDS ARE INCIDENTAL AND NOT REGULATED. SEE PAGE TYPE 5, 6, 7, AND 14 FOR AREA CLASSIFICATION.

THE TIMBER RESOURCE OF THIS WORKING CIRCLE WILL BE MANAGED AS FOLLOWS-
PONDEROSA 1 - TWO - CUT SHELTERWOOD WITH 20-YEAR REGENERATION PERIOD.
PONDEROSA 2 - THREE - CUT SHELTERWOOD WITH 30-YEAR REGENERATION PERIOD.
LODGEPOLE - CLEARCUTTING SMALL AREAS, SEEDING FROM SLASH.

REGULATION OF THE CUT WILL BE BY AREA WITH A VOLUME CHECK.

WITH THE DECISIONS AND AREAS ON PAGES TYPE 4 AND 11 AND WITH BALANCED DISTRIBUTION OF AGE CLASSES, ALLOWABLE ANNUAL CUT WOULD BE AS FOLLOWS-

	ACRES	HUNDREDS OF CU. FT.	M BD. FT.
REGENERATION CUTS			
PONDEROSA 1	2988.2	0.0	28294.4
PONDEROSA 2	7695.4	0.0	47770.7
LODGEPOLE	454.4	0.0	8564.2
FINAL REMOVAL CUTS			
PONDEROSA 1	2988.2	0.0	27507.4
PONDEROSA 2	3847.7	0.0	19852.0
LODGEPOLE	0.0	0.0	0.0
INTERMEDIATE CUTS			
PONDEROSA 1	11952.8	23217.5	5345.9
PONDEROSA 2	14460.7	16116.5	7772.6
LODGEPOLE	1363.1	773.3	4139.8
TOTAL FOR ONE YEAR			
PONDEROSA 1	17929.1	23217.5	61147.8
PONDEROSA 2	26003.9	16116.5	75395.3
LODGEPOLE	1817.5	773.3	12704.0
TOTAL ALL GROUPS	45750.5	40107.3	149247.1

TOTAL ALL GROUPS DOES NOT INCLUDE DEFERRED GROUPS, IF PRESENT.

PAGE TYPE 1, CONT.

ONLY COMMERCIAL VOLUMES ARE INCLUDED IN THE TABLES OF PAGE TYPE 1. CUTS ARE ASSIGNED TO BOARD FOOT TOTALS IF POSSIBLE. THEY APPEAR IN CUBIC-FOOT TOTALS ONLY WHEN COMMERCIAL SAWLOG CUTS ARE NOT POSSIBLE. AREAS OF INTERMEDIATE CUTS INCLUDE ACREAGE OF NONCOMMERCIAL SHOWN ON PAGE TYPE 2.

ACTUAL VOLUMES CUT DURING THE NEXT PERIOD COULD BE AS SHOWN ON PAGES TYPE 2 IF ALL POSSIBLE CULTURAL OPERATIONS, AS INDICATED BY WORK CODES, WERE PERFORMED. POTENTIAL ANNUAL CUTS WOULD THEN BE--

	ACRES	HUNDREDS OF CU. FT.	M BD. FT.
REGENERATION CUTS			
PONDEROSA 1	6226.0	29253.9	73149.3
PONDEROSA 2	5566.4	18871.4	43419.3
LODGEPOLE	447.4	0.0	7012.4
FINAL REMOVAL CUTS			
PONDEROSA 1	2600.9	32.1	4738.2
PONDEROSA 2	6494.1	3269.4	31464.6
LODGEPOLE	0.0	0.0	0.0
INTERMEDIATE CUTS			
PONDEROSA 1	13527.3	42761.9	3368.5
PONDEROSA 2	17632.3	22869.9	15422.3
LODGEPOLE	2357.7	9536.6	10187.6
TOTAL FOR ONE YEAR			
PONDEROSA 1	22354.2	72048.0	81256.0
PONDEROSA 2	29692.8	45010.7	90306.1
LODGEPOLE	2805.1	9536.6	17200.0
TOTAL ALL GROUPS	54852.2	126595.4	188762.1

PAGE TYPE 1, CONT.

THE FIRST TABLE, ABOVE, REPRESENTS YIELDS FROM AREA REGULATION WHEN VOLUME AND AREA GOALS HAVE BEEN ATTAINED.

THE SECOND TABLE CAN REPRESENT AREA REGULATION IF-
(1) VOLUME AND AREA GOALS HAVE NOT BEEN ATTAINED
(2) WORK CODING IS SUCH THAT THE AREA VALUES OF THE SECOND TABLE EQUAL AREAS OF THE FIRST TABLE.

IF NEITHER OF THESE ALTERNATIVES APPLY, YIELDS FROM AREA REGULATION WILL BE AS FOLLOWS-

	ACRES	HUNDREDS OF CU. FT.	M BD. FT.
REGENERATION CUTS			
PONDEROSA 1	2988.2	14040.6	35108.3
PONDEROSA 2	7695.4	26089.3	60026.2
LODGEPOLE	454.4	0.0	7120.9
FINAL REMOVAL CUTS			
PONDEROSA 1	2988.2	36.9	5443.8
PONDEROSA 2	3847.7	1937.1	18642.5
LODGEPOLE	0.0	0.0	0.0
INTERMEDIATE CUTS			
PONDEROSA 1	11952.8	52795.5	4158.9
PONDEROSA 2	14460.7	43604.1	29404.3
LODGEPOLE	1363.1	4337.0	4633.0
TOTAL FOR ONE YEAR			
PONDEROSA 1	17929.1	66873.0	44711.0
PONDEROSA 2	26003.9	71630.5	108073.0
LODGEPOLE	1817.5	4337.0	11753.9
TOTAL ALL GROUPS	45750.5	142840.5	164537.9

PAGE TYPE 1, CONT.

FORMULA COMPUTATION OF ALLOWABLE ANNUAL CUT. CUBIC-FOOT VOLUMES INCLUDE SAWLOG TREES-

HEYER FORMULA WITH M.A.I. FROM OPTIMUM YIELD TABLES AND COMPUTED GROWING STOCKS

	ADJUSTMENT PERIOD	HUNDREDS OF CU. FT.	M BD. FT.
PONDEROSA 1	30.0	141303.9	46849.7
PONDEROSA 2	30.0	123034.8	52369.7
LODGEPOLE	30.0	55601.2	22980.0
TOTAL		319939.9	122199.5

MEAN ANNUAL INCREMENTS USED TO OBTAIN THE RESULTS TABULATED ABOVE

	ADJUSTMENT PERIOD	HUNDREDS OF CU. FT.	M BD. FT.
PONDEROSA 1	30.0	153849.4	62386.7
PONDEROSA 2	30.0	183169.6	75746.3
LODGEPOLE	30.0	29323.4	12704.0

FORMULA COMPUTATIONS ARE BASED ON VOLUME AND AREA COMPUTATIONS SUMMARIZED ON OTHER PAGES. VOLUME GOALS ARE ON PAGES TYPE 4, 8, 9, 10, AND 11. ACTUAL AREAS AND VOLUMES ARE ON PAGES TYPE 6, 7, 13, AND 14. CUBIC VOLUMES INCLUDE ALL TREES LARGER AND OLDER THAN MINIMUM LIMITS FOR INCLUSION IN GROWING STOCK VOLUME.

STANDS SELECTED FOR HARVEST AND REGENERATION WILL INCLUDE THOSE CLASSED AS WORK INDEX 4, 5, OR 6. IT IS EXPECTED THAT NEARLY EQUAL AREAS WILL BE CUT ANNUALLY IN STANDS OF EACH SITE CLASS. IF THIS IS NOT DESIRABLE, FACTORS THAT INDICATE RELATIVE VOLUME PRODUCTION (PAGE TYPE 12) MAY BE USED FOR AREA ADJUSTMENTS.

IF WORK IS DONE DURING NEXT PERIOD AS SPECIFIED BY WORK INDEXES, PERIODIC ANNUAL INCREMENTS WILL BE-

	HUNDREDS OF CU. FT.	M BD. FT.
PONDEROSA 1	205554.6	83532.8
PONDEROSA 2	165101.4	57266.2
LODGEPOLE	39320.2	18864.7

PAGE TYPE 2

POTENTIAL WORK LOAD AND YIELDS FOR NEXT PERIOD
BOGUS NATIONAL FOREST

ACRES OF COMMERCIAL THINNING DURING NEXT PERIOD

BLOCK	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TOTAL
1	0.0	0.0	14530.7	25657.5	0.0	40188.2
2	0.0	7247.6	18036.7	7136.5	0.0	32420.8
3	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	7247.6	32567.4	32794.0	0.0	72609.0

HUNDREDS OF CU. FT. REMOVED BY THINNING

BLOCK	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TOTAL
1	0.0	0.0	116079.7	122260.1	0.0	238339.7
2	0.0	41244.0	115856.0	32179.6	0.0	189279.6
3	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	41244.0	231935.7	154439.7	0.0	427619.3

M BD. FT. REMOVED BY THINNING

BLOCK	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TOTAL
1	0.0	0.0	0.0	33685.0	0.0	33685.0
2	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	0.0	0.0	33685.0	0.0	33685.0

PAGE TYPE 2

M BD. FT. TO BE HARVESTED BY REGENERATION CUTS

BLOCK	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TOTAL
1	0.0	0.0	0.0	270723.4	200067.3	470790.7
2	0.0	0.0	0.0	153043.8	107658.3	260702.1
3	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	0.0	0.0	423767.2	307725.6	731492.9

HUNDREDS OF CU. FT. FROM REGENERATION CUTS

BLOCK	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TOTAL
1	0.0	0.0	0.0	65682.1	97435.5	163117.6
2	0.0	0.0	623.6	65590.3	63207.5	129421.5
3	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	0.0	623.6	131272.4	160643.1	292539.1

M BD. FT. TO BE HARVESTED BY FINAL REMOVAL OF OVERWOOD

BLOCK	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TOTAL
1	0.0	3839.6	0.0	14493.7	1079.5	19412.7
2	0.0	0.0	0.0	2098.1	25871.4	27969.5
3	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	3839.6	0.0	16591.7	26950.9	47382.2

PAGE TYPE 2

HUNOREOS OF CU. FT. FROM FINAL CUTS

BLOCK	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TOTAL
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	321.4	0.0	321.4
3	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	0.0	0.0	321.4	0.0	321.4

ACRES OF NONCOMMERCIAL THINNING OURING NEXT PERIOO

BLOCK	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TOTAL
1	8.9	29172.5	7287.6	3719.3	106.7	40295.0
2	515.6	7176.5	14486.2	191.2	0.0	22369.5
3	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	524.5	36348.9	21773.8	3910.5	106.7	62664.5

PAGE TYPE 2

POTENTIAL WORK LOAO ANO YIELOS FOR NEXT PERIOO
BOGUS NATIONAL FOREST

ACRES OF COMMERCIAL THINNING OURING NEXT PERIOO

BLOCK	TYPE 6	TYPE 7	TYPE 8	TYPE 9	TYPE 10	TOTAL
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	9277.3	27832.0	18554.7	0.0	55664.1
TOTAL	0.0	9277.3	27832.0	18554.7	0.0	55664.1

HUNOREOS OF CU. FT. REMOVEO BY THINNING

BLOCK	TYPE 6	TYPE 7	TYPE 8	TYPE 9	TYPE 10	TOTAL
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	29262.5	149686.1	49750.5	0.0	228699.1
TOTAL	0.0	29262.5	149686.1	49750.5	0.0	228699.1

M BO. FT. REMOVEO BY THINNING

BLOCK	TYPE 6	TYPE 7	TYPE 8	TYPE 9	TYPE 10	TOTAL
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	36938.4	117284.2	0.0	154222.6
TOTAL	0.0	0.0	36938.4	117284.2	0.0	154222.6

PAGE TYPE 2

M BD. FT. TO BE HARVESTED BY REGENERATION CUTS

BLOCK	TYPE 6	TYPE 7	TYPE 8	TYPE 9	TYPE 10	TOTAL
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	393751.6	40441.5	434193.1
TOTAL	0.0	0.0	0.0	393751.6	40441.5	434193.1

HUNDREDS OF CU. FT. FROM REGENERATION CUTS

BLOCK	TYPE 6	TYPE 7	TYPE 8	TYPE 9	TYPE 10	TOTAL
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	162320.2	26393.6	188713.8
TOTAL	0.0	0.0	0.0	162320.2	26393.6	188713.8

M BD. FT. TO BE HARVESTED BY FINAL REMOVAL OF OVERWOOD

BLOCK	TYPE 6	TYPE 7	TYPE 8	TYPE 9	TYPE 10	TOTAL
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	159386.7	155258.9	314645.6
TOTAL	0.0	0.0	0.0	159386.7	155258.9	314645.6

PAGE TYPE 2

HUNDREDS OF CU. FT. FROM FINAL CUTS

BLOCK	TYPE 6	TYPE 7	TYPE 8	TYPE 9	TYPE 10	TOTAL
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	32694.4	0.0	32694.4
TOTAL	0.0	0.0	0.0	32694.4	0.0	32694.4

ACRES OF NONCOMMERCIAL THINNING DURING NEXT PERIOD

BLOCK	TYPE 6	TYPE 7	TYPE 8	TYPE 9	TYPE 10	TOTAL
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0
3	27885.3	27832.0	46386.7	18554.7	0.0	120658.8
TOTAL	27885.3	27832.0	46386.7	18554.7	0.0	120658.8

PAGE TYPE 2

POTENTIAL WORK LOAO ANO YIELOS FOR NEXT PERIOO
8OGUS NATIONAL FOREST

ACRES OF COMMERCIAL THINNING OURING NEXT PERIOO

BLOCK	TYPE 11	TYPE 12	TYPE 13	TYPE 14	TYPE 15	TOTAL
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	10704.7	0.0	0.0	10704.7
3	0.0	0.0	0.0	9277.3	0.0	9277.3
TOTAL	0.0	0.0	10704.7	9277.3	0.0	19982.0

HUNOREOS OF CU. FT. REMOVEO BY THINNING

BLOCK	TYPE 11	TYPE 12	TYPE 13	TYPE 14	TYPE 15	TOTAL
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	95366.4	0.0	0.0	95366.4
3	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	0.0	95366.4	0.0	0.0	95366.4

M 8O. FT. REMOVEO BY THINNING

8LOCK	TYPE 11	TYPE 12	TYPE 13	TYPE 14	TYPE 15	TOTAL
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	26976.6	0.0	0.0	26976.6
3	0.0	0.0	0.0	74899.2	0.0	74899.2
TOTAL	0.0	0.0	26976.6	74899.2	0.0	101875.8

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PAGE TYPE 2

M 8O. FT. TO 8E HARVESTEO BY REGENERATION CUTS

BLOCK	TYPE 11	TYPE 12	TYPE 13	TYPE 14	TYPE 15	TOTAL
1	0.0	0.0	0.0	53030.4	0.0	53030.4
2	0.0	0.0	0.0	17093.7	0.0	17093.7
3	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	0.0	0.0	70124.1	0.0	70124.1

ACRES OF NONCOMMERCIAL THINNING OURING NEXT PERIOO

8LOCK	TYPE 11	TYPE 12	TYPE 13	TYPE 14	TYPE 15	TOTAL
1	0.0	26.7	0.0	0.0	0.0	26.7
2	0.0	3568.2	0.0	0.0	0.0	3568.2
3	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.0	3594.9	0.0	0.0	0.0	3594.9

PAGE TYPE 3

COMPARISON OF ACTUAL GROWING STOCK WITH GROWING STOCK GOAL
BOGUS NATIONAL FOREST

WORKING GROUP - PONDEROSA 1

THOUSANDS OF BOARD FEET IN TREES OF COMMERCIAL SIZE.

AGE CLASS	ACTUAL GROWING STOCK	GROWING STOCK GOAL	VOLUME DIFFERENCE	STATUS OF ACTUAL VOLUME
10	0.0	0.0	0.0	CORRECT
20	0.0	0.0	0.0	CORRECT
30	0.0	0.0	0.0	CORRECT
40	0.0	0.0	0.0	CORRECT
50	0.0	0.0	0.0	CORRECT
60	0.0	19470.8	-19470.8	DEFICIT
70	219.1	90747.8	-90528.7	DEFICIT
80	23320.2	177367.8	-154047.6	DEFICIT
90	24184.8	271217.4	-247032.6	DEFICIT
100	72120.8	308331.7	-236210.9	DEFICIT
110	130731.9	369272.1	-238540.2	DEFICIT
120	168771.6	187971.4	-19199.8	DEFICIT
130	350634.5	247209.1	103425.4	SURPLUS
140	145023.6	0.0	145023.6	SURPLUS
150	290472.7	0.0	290472.7	SURPLUS
TOTAL	1205479.1	1671588.1	-466109.0	

HUNDREDS OF MERCH. CUBIC FEET IN TREES 6.0 INCHES D.B.H. AND LARGER

AGE CLASS	ACTUAL GROWING STOCK	GROWING STOCK GOAL	VOLUME DIFFERENCE	STATUS OF ACTUAL VOLUME
10	0.0	0.0	0.0	CORRECT
20	0.0	0.0	0.0	CORRECT
30	0.0	3662.8	-3662.8	DEFICIT
40	209.1	113878.5	-113669.5	DEFICIT
50	134741.1	275738.6	-140997.5	DEFICIT
60	111286.5	401473.9	-290187.4	DEFICIT
70	207221.9	563672.9	-356451.0	DEFICIT
80	328000.1	626607.6	-298607.4	DEFICIT
90	249216.2	774133.4	-524917.2	DEFICIT
100	305525.6	766770.7	-461245.1	DEFICIT
110	685867.1	858922.5	-173055.3	DEFICIT
120	484648.6	374654.1	109994.5	SURPLUS
130	1093866.7	462076.5	631790.2	SURPLUS
140	362886.8	0.0	362886.8	SURPLUS
150	881757.3	0.0	881757.3	SURPLUS
TOTAL	4845227.1	5221591.5	-376364.4	

PAGE TYPE 3

COMPARISON OF ACTUAL GROWING STOCK WITH GROWING STOCK GOAL
BOGUS NATIONAL FOREST

WORKING GROUP - PONDEROSA 2

THOUSANDS OF BOARD FEET IN TREES OF COMMERCIAL SIZE.

AGE CLASS	ACTUAL GROWING STOCK	GROWING STOCK GOAL	VOLUME DIFFERENCE	STATUS OF ACTUAL VOLUME
10	0.0	0.0	0.0	CORRECT
20	0.0	0.0	0.0	CORRECT
30	0.0	0.0	0.0	CORRECT
40	0.0	0.0	0.0	CORRECT
50	0.0	0.0	0.0	CORRECT
60	0.0	27794.2	-27794.2	DEFICIT
70	0.0	108007.8	-108007.8	DEFICIT
80	0.0	211736.2	-211736.2	DEFICIT
90	31733.0	314599.1	-282866.0	DEFICIT
100	39451.6	336589.9	-297138.2	DEFICIT
110	105308.3	407927.4	-302619.1	DEFICIT
120	308808.7	245997.8	62810.9	SURPLUS
130	420828.4	264554.7	156273.7	SURPLUS
140	256587.7	150411.0	106176.8	SURPLUS
150	203603.3	0.0	203603.3	SURPLUS
TOTAL	1366321.2	2067618.0	-701296.8	

HUNDREDS OF MERCH. CUBIC FEET IN TREES 6.0 INCHES D.B.H. AND LARGER

AGE CLASS	ACTUAL GROWING STOCK	GROWING STOCK GOAL	VOLUME DIFFERENCE	STATUS OF ACTUAL VOLUME
10	0.0	0.0	0.0	CORRECT
20	0.0	0.0	0.0	CORRECT
30	0.0	5586.2	-5586.2	DEFICIT
40	0.0	144902.5	-144902.5	DEFICIT
50	123739.9	330913.0	-207173.1	DEFICIT
60	2816.4	457168.1	-454351.7	DEFICIT
70	96511.2	646813.8	-550302.6	DEFICIT
80	84675.3	710038.9	-625363.6	DEFICIT
90	304873.8	879182.0	-574308.1	DEFICIT
100	229096.0	793915.2	-564819.2	DEFICIT
110	477047.5	901361.7	-424314.2	DEFICIT
120	811752.2	478292.8	333459.4	SURPLUS
130	1113655.1	484954.9	628700.2	SURPLUS
140	521462.8	248656.7	272806.1	SURPLUS
150	512111.1	0.0	512111.1	SURPLUS
TOTAL	4277741.5	6081785.8	-1804044.4	

PAGE TYPE 3

COMPARISON OF ACTUAL GROWING STOCK WITH GROWING STOCK GOAL
BOGUS NATIONAL FOREST

WORKING GROUP - LODGEPOLE

THOUSANDS OF BOARD FEET IN TREES OF COMMERCIAL SIZE.

AGE CLASS	ACTUAL GROWING STOCK	GROWING STOCK GOAL	VOLUME DIFFERENCE	STATUS OF ACTUAL VOLUME
10	0.0	0.0	0.0	CORRECT
20	0.0	0.0	0.0	CORRECT
30	0.0	0.0	0.0	CORRECT
40	0.0	0.0	0.0	CORRECT
50	105.0	0.0	105.0	SURPLUS
60	0.0	23858.2	-23858.2	DEFICIT
70	0.0	43095.9	-43095.9	DEFICIT
80	0.0	60423.7	-60423.7	DEFICIT
90	0.0	74457.7	-74457.7	DEFICIT
100	65706.0	64740.7	965.3	SURPLUS
110	345274.6	79091.9	266182.7	SURPLUS
120	194711.9	0.0	194711.9	SURPLUS
130	203.8	0.0	203.8	SURPLUS
140	47947.6	0.0	47947.6	SURPLUS
150	0.0	0.0	0.0	CORRECT
TOTAL	653949.0	345668.1	308280.9	

HUNDREDS OF MERCH. CUBIC FEET IN TREES 6.0 INCHES D.B.H. AND LARGER

AGE CLASS	ACTUAL GROWING STOCK	GROWING STOCK GOAL	VOLUME DIFFERENCE	STATUS OF ACTUAL VOLUME
10	0.0	0.0	0.0	CORRECT
20	0.0	0.0	0.0	CORRECT
30	0.0	1210.9	-1210.9	DEFICIT
40	0.0	30259.4	-30259.4	DEFICIT
50	511.3	66211.1	-65699.8	DEFICIT
60	82026.8	103965.8	-21939.1	DEFICIT
70	291.1	107232.3	-106941.2	DEFICIT
80	108525.3	143638.5	-35113.2	DEFICIT
90	0.0	173918.7	-173918.7	DEFICIT
100	152405.2	145383.9	7021.3	SURPLUS
110	822671.8	173694.5	648977.3	SURPLUS
120	458983.8	0.0	458983.8	SURPLUS
130	459.0	0.0	459.0	SURPLUS
140	107975.3	0.0	107975.3	SURPLUS
150	0.0	0.0	0.0	CORRECT
TOTAL	1733849.5	945515.1	788334.3	

PAGE TYPE 4

RECORD OF MANAGEMENT DECISIONS AND CURRENT CONDITIONS
BOGUS NATIONAL FOREST

NUMBER OF BLOCKS - 3
NUMBER OF COMPARTMENTS - 0
MINIMUM AGE FOR GROWING STOCK - 30
NUMBER OF WORKING GROUPS - 3
MINIMUM M BD. FT. FOR GROWING STOCK - 1.5
LENGTH OF PLANNING PERIOD, YEARS - 10.

	*- - - - - - - - - - W O R K I N G	G R O U P - - - - - - - - - - - - -*	
	PONDEROSA 1	PONDEROSA 2	LODGEPOLE
LOWEST SITE CLASS TO BE MANAGED	50.0	40.0	50.0
LENGTH OF CUTTING CYCLE, YEARS	20.0	20.0	30.0
LENGTH OF ADJUSTMENT PERIOD, YEARS	30.0	30.0	30.0
EXPECTED DELAY IN REGENERATION, YEARS	0.0	0.0	10.0
STOCKING LEVEL FOR INITIAL THINNING	120.0	110.0	110.0
STOCKING LEVEL, SUBSEQUENT THINNINGS	100.0	90.0	100.0
MINIMUM COMMERCIAL CUT, M BD. FT.	1.0	1.0	1.5
MINIMUM COMMERCIAL CUT, CU. FT.	2.4	2.4	2.4
LENGTH OF PREDICTION PERIOD, YEARS	10.0	10.0	10.0

CUBIC FEET IN HUNDREDS.

PAGE TYPE 5

AREAS OF TYPES IN WORKING CIRCLE
BOGUS NATIONAL FOREST

	COVER TYPE	ACRES	*		COVER TYPE	ACRES	*		COVER TYPE	ACRES
1	PP1 0-30	26008.7	*	16		0.0	*	26	DEFOREST-B	30152.7
2	PP1 31-50	47591.3	*	17		0.0	*	27	DEFOREST-G	80685.5
3	PP1 51-100	90885.6	*	18		0.0	*	28	RECREATION	6911.1
4	PP1 101-40	113744.1	*	19		0.0	*	29	BARREN	581.6
5	PP1 141+	32807.4	*	20		0.0	*	30	BRUSHLAND	3390.2
6	PP2 0-30	65297.0	*	21		0.0	*	31	RANGE-HERB	16397.6
7	PP2 31-50	37109.4	*	22		0.0	*	32	PRIVATE	47799.4
8	PP2 51-100	83496.1	*	23		0.0	*	33	RIGHTS/WAY	5345.7
9	PP2 101-40	120605.5	*	24		0.0	*	34		0.0
10	PP2 141+	27832.0	*	25		0.0	*	35		0.0
11	LGP 0-30	3643.7	*							
12	LGP 31-50	3603.8	*							
13	LGP 51-100	10744.7	*							
14	LGP 101-40	30347.7	*							
15	LGP 141+	0.0	*							
									TOTAL AREA	884981.1

*************** ACRES BY WORKING GROUPS ***************

PONDEROSA 1	PONDEROSA 2	LODGEPOLE
311037.2	334340.2	48340.0

DEFORESTED ACRES - 110838.2

PAGE TYPE 6

TOTAL AREAS OF BLOCKS AND WORKING CIRCLE
BOGUS NATIONAL FOREST

BLOCK NO.	TOTAL ACRES	* PLANTABLE ACRES FOREST SOIL * BRUSHY	GRASSY	TOTAL	******** FOREST AND REGENERATING BY WORKING GROUPS ******** PONDEROSA 1	PONDEROSA 2	LODGEPOLE
1	207509.0	11477.9	4066.0	15544.0	158149.3	0.0	10993.5
2	208389.3	84.5	11206.9	11291.4	152887.9	0.0	18778.4
3	469082.8	18590.3	65412.5	84002.8	0.0	334340.2	18568.0
TOTAL	884981.1	30152.7	80685.5	110838.2	311037.2	334340.2	48340.0

PAGE TYPE 7

DISTRIBUTION OF AREA BY SITE INDEX CLASS
BOGUS NATIONAL FOREST

BLOCK	SITE INDEX	DEFORESTED ACRES	PONDEROSA 1	PONDEROSA 2	LODGEPOLE
1	10	0.0	0.0	0.0	0.0
1	20	0.0	0.0	0.0	0.0
1	30	0.0	0.0	0.0	0.0
1	40	7407.5	0.0	0.0	0.0
1	50	4292.6	58842.8	0.0	40.0
1	60	3843.8	69782.9	0.0	3674.8
1	70	0.0	29523.6	0.0	7278.7
1	80	0.0	0.0	0.0	0.0
1	90	0.0	0.0	0.0	0.0
1	100	0.0	0.0	0.0	0.0
1	110	0.0	0.0	0.0	0.0
1	120	0.0	0.0	0.0	0.0
1	130	0.0	0.0	0.0	0.0
1	140	0.0	0.0	0.0	0.0
2	10	0.0	0.0	0.0	0.0
2	20	0.0	0.0	0.0	0.0
2	30	0.0	0.0	0.0	0.0
2	40	0.0	0.0	0.0	0.0
2	50	7278.7	79385.5	0.0	3568.2
2	60	222.2	55181.3	0.0	7229.8
2	70	3790.5	18321.0	0.0	7980.5
2	80	0.0	0.0	0.0	0.0
2	90	0.0	0.0	0.0	0.0
2	100	0.0	0.0	0.0	0.0
2	110	0.0	0.0	0.0	0.0
2	120	0.0	0.0	0.0	0.0
2	130	0.0	0.0	0.0	0.0
2	140	0.0	0.0	0.0	0.0

PAGE TYPE 7,CONT.,

BLOCK	SITE INDEX	DEFORESTED ACRES	PONDEROSA 1	PONDEROSA 2	LODGEPOLE
3	10	0.0	0.0	0.0	0.0
3	20	0.0	0.0	0.0	0.0
3	30	0.0	0.0	9277.3	0.0
3	40	0.0	0.0	83713.9	0.0
3	50	37198.3	0.0	74218.8	0.0
3	60	28072.0	0.0	102108.6	0.0
3	70	18732.5	0.0	65021.4	18568.0
3	80	0.0	0.0	0.0	0.0
3	90	0.0	0.0	0.0	0.0
3	100	0.0	0.0	0.0	0.0
3	110	0.0	0.0	0.0	0.0
3	120	0.0	0.0	0.0	0.0
3	130	0.0	0.0	0.0	0.0
3	140	0.0	0.0	0.0	0.0
TOTAL		110838.2	311037.2	334340.2	48340.0

PAGE TYPE 11

GROWING STDCK GOALS FDR WORKING CIRCLE

WDRKING GRDUP - PDNDERDSA 1

8OGUS NATIONAL FOREST

SITE CLASS	ACRES	ROTATIDN AGE	CU. FT. TD 8D. FT. LIMIT	CU. FT. TD RDTATION AGE	M 8D. FT. A8DVE 8O. FT. LIMIT
50.	148724.4	11D.	311464.	1957760.	569556.
60.	128756.2	11D.	275841.	2194825.	722268.
70.	5122D.5	11D.	11352D.	1069007.	379764.
TOTALS	335627.1		700825.	5221592.	1671588.

CU8IC FEET IN HUNDREDS. TOTAL AREA INCLUDES ANY LOW SITE ACRES INCORRECTLY CLASSED AS DPERA8LE TYPES.

PAGE TYPE 12

CDNVERSION OF AREAS TO STANDARD ACRES

WORKING GRDUP - PONDERDSA 1

8DGUS NATIDNAL FOREST

SITE INDEX CLASS	TDTAL YIELD PER ACRE M 8O. FT.	ACRES IN SITE CLASS	REDUCTIDN FACTDR	AREA IN STANDARD ACRES	EQUIVALENT OF STANDARD ACRE IN SITE ACRES
50.	15.2	148724.4	.65251	97D44.1	1.53254
60.	23.3	128756.2	1.D000D	128756.2	1.00000
70.	28.6	51220.5	1.22523	62756.6	.81618

SITE INDEX CLASS	TDTAL YIELD PER ACRE CU. FT.	ACRES IN SITE CLASS	REDUCTION FACTOR	AREA IN STANDARD ACRES	EQUIVALENT DF STANDARD ACRE IN SITE ACRES
50.	4111.0	148724.4	.73833	109807.1	1.35441
6D.	5568.0	128756.2	1.0DDD0	128756.2	1.00000
70.	6956.D	5122D.5	1.24928	63988.8	.80046

PAGE TYPE B

YIELOS PER ACRE OF MANAGEO, EVEN-AGEO STANOS 8ASED ON PREOETERMINEO STANOAROS FOR
SITE INOEX 70., 20.-YEAR CUTTING CYCLE
THINNING LEVELS= INITIAL - 110., SUBSEQUENT - 90.

WORKING GROUP - PONOEROSA 2

	ENTIRE STANO BEFORE ANO AFTER THINNING							PERIOOIC CUT ANO MORTALITY				
STANO AGE (YEARS)	TREES NO.	BASAL AREA SQ. FT.	AVERAGE 0.8.H. IN.	AVERAGE HEIGHT FT.	TOTAL VOLUME CU. FT.	MERCHANT-A8LE VOLUME CU. FT.	SAWTIMBER VOLUME M BO. FT.	TREES NO.	8ASAL AREA SQ. FT.	TOTAL VOLUME CU. FT.	MERCHANT-A8LE VOLUME CU. FT.	SAWTIMBER VOLUME M BO. FT.
30.	950	119	4.B	25	1188	312.	0.000					
30.	417	74	5.7	26	799	312.	0.000	533	45	3B9	0.	0.000
40.	413	104	6.8	35	1502	1020.	0.000					
50.	406	131	7.7	44	2370	1900.	1.160					
50.	215	85	B.5	45	1568	1364.	1.160	191	46	802	536.	0.000
60.	214	105	9.5	51	2221	2034.	3.900					
70.	213	126	10.4	5B	3043	2829.	8.150					
70.	132	90	11.2	59	2240	209B.	7.050	81	36	B03	731.	1.100
B0.	132	107	12.2	65	2969	2796.	10.B20					
90.	132	124	13.1	69	3722	3519.	14.B00					
90.	85	90	13.9	70	2737	2596.	11.380	47	34	9B5	923.	3.420
100.	B5	103	14.9	74	3355	3193.	14.980					
110.	85	116	15.8	78	3975	3794.	1B.780					
110.	27	45	17.5	B0	1593	1527.	7.960	5B	71	2382	2267.	10.B20
120.	27	53	19.0	B3	1960	1884.	10.460					
130.	27	61	20.4	B6	2341	2256.	13.180					
130.	9	24	22.0	B7	92B	896.	5.440	18	37	1413	1360.	7.740
140.	9	2B	24.0	90	113B	1102.	7.080					
						TOTAL YIELOS				7912	6919.	30.160

MINIMUM CUTS FOR INCLUSION IN TOTAL YIELOS-- 240. CU8IC FEET ANO 1000. 8OARO FEET

PAGE TYPE 9

GROWING STOCK OF MANAGEO, REGULATEO, EVEN-AGEO STANOS
SITE INOEX 70., 20.-YEAR CUTTING CYCLE
OENSITY LEVEL- 110. ANO 90.

WORKING GROUP - PONOEROSA 2

VOLUMES PRESENT PER ACRE AT ENO OF EACH YEAR

MERCHANTABLE CUBIC FEET

	YEAR									
OECAOE	0	1	2	3	4	5	6	7	8	9
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	312.0	382.8	453.6	524.4	595.2	666.0	736.8	807.6	878.4	949.2
4	1020.0	1108.0	1196.0	1284.0	1372.0	1460.0	1548.0	1636.0	1724.0	1812.0
5	1364.0	1431.0	1498.0	1565.0	1632.0	1699.0	1766.0	1833.0	1900.0	1967.0
6	2034.0	2113.5	2193.0	2272.5	2352.0	2431.5	2511.0	2590.5	2670.0	2749.5
7	2098.0	2167.8	2237.6	2307.4	2377.2	2447.0	2516.8	2586.6	2656.4	2726.2
8	2796.0	2868.3	2940.6	3012.9	3085.2	3157.5	3229.8	3302.1	3374.4	3446.7
9	2596.0	2655.7	2715.4	2775.1	2834.8	2894.5	2954.2	3013.9	3073.6	3133.3
10	3193.0	3253.1	3313.2	3373.3	3433.4	3493.5	3553.6	3613.7	3673.8	3733.9
11	1527.0	1562.7	1598.4	1634.1	1669.8	1705.5	1741.2	1776.9	1812.6	1848.3
12	1884.0	1921.2	1958.4	1995.6	2032.8	2070.0	2107.2	2144.4	2181.6	2218.8
13	896.0	916.6	937.2	957.8	978.4	999.0	1019.6	1040.2	1060.8	1081.4
14	1102.0									

THOUSANOS OF BOARO FEET

0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	0.000	.116	.232	.348	.464	.580	.696	.812	.928	1.044
5	1.160	1.434	1.708	1.982	2.256	2.530	2.804	3.078	3.352	3.626
6	3.900	4.325	4.750	5.175	5.600	6.025	6.450	6.875	7.300	7.725
7	7.050	7.427	7.804	8.181	8.558	8.935	9.312	9.689	10.066	10.443
8	10.820	11.218	11.616	12.014	12.412	12.810	13.208	13.606	14.004	14.402
9	11.380	11.740	12.100	12.460	12.820	13.180	13.540	13.900	14.260	14.620
10	14.980	15.360	15.740	16.120	16.500	16.880	17.260	17.640	18.020	18.400
11	7.960	8.210	8.460	8.710	8.960	9.210	9.460	9.710	9.960	10.210
12	10.460	10.732	11.004	11.276	11.548	11.820	12.092	12.364	12.636	12.908
13	5.440	5.604	5.768	5.932	6.096	6.260	6.424	6.588	6.752	6.916
14	7.080									

PAGE TYPE 10

DISTRIBUTION OF AREA AND GROWING STOCK GOALS

FOR SITE INDEX CLASS- 70., ROTATION- 110., AND 82768.3 ACRES OF THIS SITE CLASS AND GROUP

WORKING GROUP - PONDEROSA 2

AGE CLASS	ACRES IN CLASS	HUNDREDS OF CU. FT.	M BD. FT.
1- 10	7524.4	0.0	0.0
11- 20	7524.4	0.0	0.0
21- 30	7524.4	2347.6	0.0
31- 40	7524.4	52776.1	0.0
41- 50	7524.4	109133.8	0.0
51- 60	7524.4	130360.1	18988.6
61- 70	7524.4	180446.3	46105.7
71- 80	7524.4	186748.0	68648.8
81- 90	7524.4	233357.8	95311.5
91-100	7524.4	220039.6	100525.9
101-110	7524.4	248068.0	120300.0
111-120	0.0	129671.7	70240.2
121-130	0.0	146921.3	84137.8
131-140	0.0	75943.7	47719.7
141-150	0.0	0.0	0.0
TOTALS	82768.3	1715814.1	651978.3

PAGE TYPE 11

GROWING STOCK GOALS FOR WORKING CIRCLE

WORKING GROUP - PONDEROSA 2

BOGUS NATIONAL FOREST

SITE CLASS	ACRES	ROTATION AGE	CU. FT. TO BD. FT. LIMIT	CU. FT. TO ROTATION AGE	M BD. FT. ABOVE BD. FT. LIMIT
40.	83713.9	90.	202588.	698039.	162433.
50.	109459.9	110.	221693.	1478694.	481059.
60.	128703.7	110.	263048.	2189238.	772147.
70.	82768.3	110.	175025.	1715814.	651978.
TOTALS	413923.3		862354.	6081786.	2067618.

CUBIC FEET IN HUNDREDS. TOTAL AREA INCLUDES ANY LOW SITE ACRES INCORRECTLY CLASSED AS OPERABLE TYPES.

PAGE TYPE 12

CONVERSION OF AREAS TO STANDARD ACRES

WORKING GROUP - PONDEROSA 2

BOGUS NATIONAL FOREST

SITE INDEX CLASS	TOTAL YIELD PER ACRE M BD. FT.	ACRES IN SITE CLASS	REDUCTION FACTOR	AREA IN STANDARD ACRES	EQUIVALENT OF STANDARD ACRE IN SITE ACRES
40.	8.7	83713.9	.48930	40961.4	2.04373
50.	17.8	109459.9	1.00000	109459.9	1.00000
60.	23.0	128703.7	1.29673	166894.5	.77117
70.	30.2	82768.3	1.69820	140557.1	.58886

SITE INDEX CLASS	TOTAL YIELD PER ACRE CU. FT.	ACRES IN SITE CLASS	REDUCTION FACTOR	AREA IN STANDARD ACRES	EQUIVALENT OF STANDARD ACRE IN SITE ACRES
40.	2373.0	83713.9	.57305	47972.3	1.74505
50.	4141.0	109459.9	1.00000	109459.9	1.00000
60.	5550.0	128703.7	1.34026	172495.9	.74613
70.	6919.0	82768.3	1.67085	138293.7	.59850

PAGE TYPE 8

YIELDS PER ACRE OF MANAGED, EVEN-AGED STANDS BASED ON PREDETERMINED STANDARDS FOR
SITE INDEX 70., 30.-YEAR CUTTING CYCLE
THINNING LEVELS= INITIAL - 110., SUBSEQUENT - 100.

WORKING GROUP - LODGEPOLE

	ENTIRE STAND BEFORE AND AFTER THINNING							PERIODIC CUT AND MORTALITY				
STAND AGE (YEARS)	TREES NO.	BASAL AREA SQ. FT.	AVERAGE D.B.H. IN.	AVERAGE HEIGHT FT.	TOTAL VOLUME CU. FT.	MERCHANT-ABLE VOLUME CU. FT.	SAWTIMBER VOLUME M BD. FT.	TREES NO.	BASAL AREA SQ. FT.	TOTAL VOLUME CU. FT.	MERCHANT-ABLE VOLUME CU. FT.	SAWTIMBER VOLUME M BD. FT.
30.	1000	126	4.8	28	1674	341.	0.000					
30.	432	71	5.5	29	1018	341.	0.000	568	55	656	0.	0.000
40.	430	99	6.5	37	1812	1186.	0.000					
50.	429	128	7.4	41	2647	2158.	0.000					
60.	428	153	8.1	49	3728	3264.	13.510					
60.	227	96	8.8	50	2389	2175.	8.900	201	57	1339	1089.	4.610
70.	225	115	9.7	56	3228	2993.	12.570					
80.	224	137	10.6	61	4184	3934.	16.750					
90.	224	159	11.4	65	5112	4826.	21.060					
90.	125	100	12.1	66	3220	3049.	13.580	99	59	1892	1777.	7.480
100.	125	117	13.1	69	3922	3728.	17.040					
110.	125	134	14.0	72	4631	4416.	20.630					
120.	125	151	14.9	75	5397	5160.	24.590					
							TOTAL YIELDS			9284	8026.	36.680

MINIMUM CUTS FOR INCLUSION IN TOTAL YIELDS-- 240. CUBIC FEET AND 1500. BOARD FEET

PAGE TYPE 9

GROWING STOCK OF MANAGEO, REGULATEO, EVEN-AGEO STANOS
SITE INOEX 70., 30.-YEAR CUTTING CYCLE
OENSITY LEVEL- 110. ANO 100.

WORKING GROUP - LOOGEPOLE

VOLUMES PRESENT PER ACRE AT ENO OF EACH YEAR

MERCHANTABLE CUBIC FEET

	YEAR									
OECAOE	0	1	2	3	4	5	6	7	8	9
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	341.0	425.5	510.0	594.5	679.0	763.5	848.0	932.5	1017.0	1101.5
4	1186.0	1283.2	1380.4	1477.6	1574.8	1672.0	1769.2	1866.4	1963.6	2060.8
5	2158.0	2268.6	2379.2	2489.8	2600.4	2711.0	2821.6	2932.2	3042.8	3153.4
6	2175.0	2256.8	2338.6	2420.4	2502.2	2584.0	2665.8	2747.6	2829.4	2911.2
7	2993.0	3087.1	3181.2	3275.3	3369.4	3463.5	3557.6	3651.7	3745.8	3839.9
8	3934.0	4023.2	4112.4	4201.6	4290.8	4380.0	4469.2	4558.4	4647.6	4736.8
9	3049.0	3116.9	3184.8	3252.7	3320.6	3388.5	3456.4	3524.3	3592.2	3660.1
10	3728.0	3796.8	3865.6	3934.4	4003.2	4072.0	4140.8	4209.6	4278.4	4347.2
11	4416.0	4490.4	4564.8	4639.2	4713.6	4788.0	4862.4	4936.8	5011.2	5085.6
12	5160.0									

THOUSANOS OF BOARO FEET

0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5	0.000	1.351	2.702	4.053	5.404	6.755	8.106	9.457	10.808	12.159
6	8.900	9.267	9.634	10.001	10.368	10.735	11.102	11.469	11.836	12.203
7	12.570	12.988	13.406	13.824	14.242	14.660	15.078	15.496	15.914	16.332
8	16.750	17.181	17.612	18.043	18.474	18.905	19.336	19.767	20.198	20.629
9	13.580	13.926	14.272	14.618	14.964	15.310	15.656	16.002	16.348	16.694
10	17.040	17.399	17.758	18.117	18.476	18.835	19.194	19.553	19.912	20.271
11	20.630	21.026	21.422	21.818	22.214	22.610	23.006	23.402	23.798	24.194
12	24.590									

PAGE TYPE 10

DISTRIBUTION OF AREA AND GROWING STOCK GOALS

FOR SITE INDEX CLASS- 70., ROTATION- 120., AND 35227.4 ACRES OF THIS SITE CLASS AND GROUP

WORKING GROUP - LODGEPOLE

AGE CLASS	ACRES IN CLASS	HUNDREDS OF CU. FT.	M BD. FT.
0	2935.6		
1- 10	2935.6	0.0	0.0
11- 20	2935.6	0.0	0.0
21- 30	2935.6	1001.0	0.0
31- 40	2935.6	23653.7	0.0
41- 50	2935.6	50510.2	0.0
51- 60	2935.6	78011.0	20063.2
61- 70	2935.6	77057.0	32052.5
71- 80	2935.6	103056.2	43649.7
81- 90	2935.6	124672.7	53934.6
91-100	2935.6	100470.0	45452.1
101-110	2935.6	120548.1	55819.3
111-120	0.0	0.0	0.0
121-130	0.0	0.0	0.0
131-140	0.0	0.0	0.0
141-150	0.0	0.0	0.0
TOTALS	35227.4	678980.0	250971.3

AGE CLASS ZERO REPRESENTS CLEARCUT ACRES NOT YET REFORESTED BECAUSE OF DELAY OF 10. YEARS EXPECTED AFTER SCHEDULED REGENERATION CUTTING.

PAGE TYPE 11

GROWING STOCK GOALS FOR WORKING CIRCLE

WORKING GROUP - LODGEPOLE

BOGUS NATIONAL FOREST

SITE CLASS	ACRES	ROTATION AGE	CU. FT. TO BD. FT. LIMIT	CU. FT. TO ROTATION AGE	M BD. FT. ABOVE BD. FT. LIMIT
50.	6640.6	120.	12502.	74084.	24933.
60.	12655.7	120.	21157.	192451.	69764.
70.	35227.4	120.	81825.	678980.	250971.
TOTALS	55005.2		115483.	945515.	345668.

CUBIC FEET IN HUNDREDS. TOTAL AREA INCLUDES ANY LOW SITE ACRES INCORRECTLY CLASSED AS OPERABLE TYPES.

PAGE TYPE 12

CONVERSION OF AREAS TO STANDARD ACRES

WORKING GROUP - LODGEPOLE

BOGUS NATIONAL FOREST

SITE INDEX CLASS	TOTAL YIELD PER ACRE M BD. FT.	ACRES IN SITE CLASS	REDUCTION FACTOR	AREA IN STANDARD ACRES	EQUIVALENT OF STANDARD ACRE IN SITE ACRES
50.	17.7	6640.6	.73682	4892.9	1.35718
60.	24.1	12655.7	1.00000	12655.7	1.00000
70.	36.7	35227.4	1.52262	53638.0	.65676

SITE INDEX CLASS	TOTAL YIELD PER ACRE CU. FT.	ACRES IN SITE CLASS	REDUCTION FACTOR	AREA IN STANDARD ACRES	EQUIVALENT OF STANDARD ACRE IN SITE ACRES
50.	4386.0	6640.6	.72700	4827.7	1.37551
60.	6033.0	12655.7	1.00000	12655.7	1.00000
70.	8026.0	35227.4	1.33035	46864.7	.75168

PAGE TYPE 13

VOLUMES OF BLOCKS AND WORKING CIRCLE
BOGUS NATIONAL FOREST

	TOTALS	BLOCK NO. 1	BLOCK NO. 2	BLOCK NO. 3	BLOCK NO. 4	BLOCK NO. 5	BLOCK NO. 6	BLOCK NO.
PONDEROSA 1								
TOTAL CU. FT.	6364169.1	3409318.4	2954850.7	0.0				
MERCH. CU. FT.	4845227.1	2592262.9	2252964.3	0.0				
M BD. FT.	1205479.1	715735.4	489743.7	0.0				
PONDEROSA 2								
TOTAL CU. FT.	5554914.0	0.0	0.0	5554914.0				
MERCH. CU. FT.	4277741.5	0.0	0.0	4277741.5				
M BD. FT.	1366321.2	0.0	0.0	1366321.2				
LODGEPOLE								
TOTAL CU. FT.	1966950.4	334040.0	767312.2	865598.1				
MERCH. CU. FT.	1733849.5	306054.2	619582.1	808213.2				
M BD. FT.	653949.0	129110.3	184678.6	340160.1				
TOTAL VOLUME OF BLOCK								
TOTAL CU. FT.	13886033.4	3743358.4	3722162.9	6420512.1				
MERCH. CU. FT.	10856818.1	2898317.1	2872546.4	5085954.6				
M BD. FT.	3225749.3	844845.7	674422.3	1706481.3				

CUBIC FEET IN HUNDREDS, BOARD FEET IN THOUSANDS

PAGE TYPE 14

TOTAL AREAS AND VOLUMES OF BLOCKS AND WORKING CIRCLE
BOGUS NATIONAL FOREST

BLOCK NO.	TYPE NO.	TOTAL ACRES	TOTAL CU. FT.	MERCH. CU. FT.	M BD. FT.	ACRES LOW SITE	NUMBER OF RECORDS
1	1	7287.6	0.0	0.0	0.0	0.0	5.
1	2	33114.0	301634.2	38789.0	0.0	0.0	15.
1	3	29385.8	611637.3	351176.3	7119.8	0.0	16.
1	4	70027.4	1958300.3	1708379.5	534544.8	0.0	31.
1	5	18334.5	537746.6	493918.0	174070.8	0.0	8.
1	6	0.0	0.0	0.0	0.0	0.0	0.
1	7	0.0	0.0	0.0	0.0	0.0	0.
1	8	0.0	0.0	0.0	0.0	0.0	0.
1	9	0.0	0.0	0.0	0.0	0.0	0.
1	10	0.0	0.0	0.0	0.0	0.0	0.
1	11	3630.4	0.0	0.0	0.0	0.0	1.
1	12	35.6	925.3	511.3	105.0	0.0	2.
1	13	0.0	0.0	0.0	0.0	0.0	0.
1	14	7327.5	333114.7	305542.9	129005.2	0.0	5.
1	15	0.0	0.0	0.0	0.0	0.0	0.
1	16	0.0	0.0	0.0	0.0	0.0	0.
1	17	0.0	0.0	0.0	0.0	0.0	0.
1	18	0.0	0.0	0.0	0.0	0.0	0.
1	19	0.0	0.0	0.0	0.0	0.0	0.
1	20	0.0	0.0	0.0	0.0	0.0	0.
1	21	0.0	0.0	0.0	0.0	0.0	0.
1	22	0.0	0.0	0.0	0.0	0.0	0.
1	23	0.0	0.0	0.0	0.0	0.0	0.
1	24	0.0	0.0	0.0	0.0	0.0	0.
1	25	0.0	0.0	0.0	0.0	0.0	0.
1	26	11477.9	0.0	0.0	0.0	0.0	7.
1	27	4066.0	0.0	0.0	0.0	0.0	5.

PAGE TYPE 14, CONT.

BLOCK NO.	TYPE NO.	TOTAL ACRES	TOTAL CU. FT.	MERCH. CU. FT.	M BD. FT.	ACRES LOW SITE	NUMBER OF RECORDS
2	1	18721.1	0.0	0.0	0.0	0.0	13.
2	2	14477.3	248077.6	96161.2	0.0	0.0	8.
2	3	61499.8	1174498.1	850074.1	112725.0	0.0	29.
2	4	43716.7	1092254.9	918889.8	260616.8	0.0	21.
2	5	14472.9	440020.1	387839.3	116401.9	0.0	6.
2	6	0.0	0.0	0.0	0.0	0.0	0.
2	7	0.0	0.0	0.0	0.0	0.0	0.
2	8	0.0	0.0	0.0	0.0	0.0	0.
2	9	0.0	0.0	0.0	0.0	0.0	0.
2	10	0.0	0.0	0.0	0.0	0.0	0.
2	11	0.0	0.0	0.0	0.0	0.0	0.
2	12	3568.2	40874.4	0.0	0.0	0.0	1.
2	13	10744.7	433035.0	343248.3	65706.0	0.0	4.
2	14	4465.5	293402.8	276333.8	118972.7	0.0	3.
2	15	0.0	0.0	0.0	0.0	0.0	0.
2	16	0.0	0.0	0.0	0.0	0.0	0.
2	17	0.0	0.0	0.0	0.0	0.0	0.
2	18	0.0	0.0	0.0	0.0	0.0	0.
2	19	0.0	0.0	0.0	0.0	0.0	0.
2	20	0.0	0.0	0.0	0.0	0.0	0.
2	21	0.0	0.0	0.0	0.0	0.0	0.
2	22	0.0	0.0	0.0	0.0	0.0	0.
2	23	0.0	0.0	0.0	0.0	0.0	0.
2	24	0.0	0.0	0.0	0.0	0.0	0.
2	25	0.0	0.0	0.0	0.0	0.0	0.
2	26	84.5	0.0	0.0	0.0	0.0	2.
2	27	11206.9	0.0	0.0	0.0	0.0	8.

BLOCK NO.	TYPE NO.	TOTAL ACRES	TOTAL CU. FT.	MERCH. CU. FT.	M 8D. FT.	ACRES LOW SITE	NUMBER OF RECORDS
3	1	0.0	0.0	0.0	0.0	0.0	0.
3	2	0.0	0.0	0.0	0.0	0.0	0.
3	3	0.0	0.0	0.0	0.0	0.0	0.
3	4	0.0	0.0	0.0	0.0	0.0	0.
3	5	0.0	0.0	0.0	0.0	0.0	0.
3	6	65297.0	0.0	0.0	0.0	0.0	12.
3	7	37109.4	619749.3	123739.9	0.0	0.0	4.
3	8	83496.1	997668.7	717972.8	71184.7	0.0	9.
3	9	120605.5	3262467.2	2923917.6	1091533.2	9277.3	13.
3	10	27832.0	675028.8	512111.1	203603.3	0.0	3.
3	11	13.3	0.0	0.0	0.0	0.0	1.
3	12	0.0	0.0	0.0	0.0	0.0	0.
3	13	0.0	0.0	0.0	0.0	0.0	0.
3	14	18554.7	865598.1	808213.2	340160.1	0.0	2.
3	15	0.0	0.0	0.0	0.0	0.0	0.
3	16	0.0	0.0	0.0	0.0	0.0	0.
3	17	0.0	0.0	0.0	0.0	0.0	0.
3	18	0.0	0.0	0.0	0.0	0.0	0.
3	19	0.0	0.0	0.0	0.0	0.0	0.
3	20	0.0	0.0	0.0	0.0	0.0	0.
3	21	0.0	0.0	0.0	0.0	0.0	0.
3	22	0.0	0.0	0.0	0.0	0.0	0.
3	23	0.0	0.0	0.0	0.0	0.0	0.
3	24	0.0	0.0	0.0	0.0	0.0	0.
3	25	0.0	0.0	0.0	0.0	0.0	0.
3	26	18590.3	0.0	0.0	0.0	0.0	4.
3	27	65412.5	0.0	0.0	0.0	0.0	13.
TOTALS		804555.5	13886033.4	10856818.1	3225749.3	9277.3	251.

CUBIC FEET IN HUNDREDS, BOARD FEET IN THOUSANDS

APPENDIX 3

Alternative Outputs

Reproduced below are examples of the type 5 pages produced by optional subroutine MAPS. MAPS produces two type 5 pages for each compartment if maps are desired, and a single type 5 page per compartment if map output is suppressed.

Subroutine AREA1 prints a type 5 page with two compartments per page. An example is not given; the format for each compartment is the same as the top half of the page without maps produced by MAPS.

Type 6 pages produced by MAPS and AREA1 are not reproduced because they do not differ in format from the page type 6 of AREA2 in appendix 2.

PAGE TYPE 5

BOGUS NATIONAL FOREST

TYPE MAP OF COMPARTMENT NO. 206

BLOCK NO. 1

```
                      5 5
            5 5 5 5 5 5 5               3 3323232 3 3
  5 5 5 5 5 5 5 5 5 5 5 5 5       5 5 5 3 3323232 3 3 3 3
3 5 5 5 5 5 5 5 5 5 5 5 5 5 5   3 3 5 5 5 53232323131 3 3 3 3
3 5 5 5 5 5 5 5 5 5 3 5 5 5 5 5 3 5 5 5 5 5 5 3 3 3 3 33131323232
3 5 5 5 5 5 5 5 5 3 3 5 5 5 5 5 5 5 5 5 5 3 3 3 4 4 3 3 3 4 33232
  3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3 3 4 4 3 3 332
  3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 3 3 3 3 3 3 3
    5 5 5 5 5 5 5 5 5 4 4 4 4 5 5 5 5 3 3 3 3 5 3
      5 5 5 5 5 5 5 5 3 3 4 4 5 5 5 5 3     5
      5 5 5 5 5 5 5 5 5 3 4 4 5 5   5
        5 5 5 5 5 5 5 5     4
          5     5
```

COVER TYPE	ACRES	*	COVER TYPE	ACRES	*	COVER TYPE	ACRES
1 PP1 0-30	0.0	*	16	0.0	*	26 DEFOREST-B	0.0
2 PP1 31-50	0.0	*	17	0.0	*	27 DEFOREST-G	0.0
3 PP1 51-100	280.0	*	18	0.0	*	28 RECREATION	0.0
4 PP1 101-40	62.2	*	19	0.0	*	29 BARREN	0.0
5 PP1 141+	742.2	*	20	0.0	*	30 BRUSHLAND	0.0
6 PP2 0-30	0.0	*	21	0.0	*	31 RANGE-HERB	17.8
7 PP2 31-50	0.0	*	22	0.0	*	32 PRIVATE	66.7
8 PP2 51-100	0.0	*	23	0.0	*	33 RIGHTS/WAY	0.0
9 PP2 101-40	0.0	*	24	0.0	*	34	0.0
10 PP2 141+	0.0	*	25	0.0	*	35	0.0
11 LGP 0-30	0.0	*					
12 LGP 31-50	0.0	*					
13 LGP 51-100	0.0	*					
14 LGP 101-40	0.0	*					
15 LGP 141+	0.0	*					

TOTAL AREA 1168.9

*************** ACRES BY WORKING GROUPS ***************

PONDEROSA 1	PONDEROSA 2	LODGEPOLE
1084.4	0.0	0.0

DEFORESTED ACRES - 0.0

PAGE TYPE 5

BOGUS NATIONAL FOREST

SUBCOMPARTMENT MAP OF COMPARTMENT NO. 206

BLOCK NO. 1

```
                      1 1
            2 2 2 1 1 1 1                   3 3         4 4
  5 5 5 5 5 2 2 2 1 1 1 1 1       6 6 6 3 3         4 4 4 4
7 5 5 5 5 5 2 2 2 2 1 1 1 1 1   8 8 6 6 6 6                 4 4 4 4
7 5 5 5 5 2 2 2 2 2 9 1 1 1 1 1 8 6 6 6 6 6 61010 4 4 4
7 5 5 5 5 2 2 2 2 9 9 1 1 1 1 1 6 6 6 6 61010101111 4 4 41213
  7 5 5 5 2 2 2 21414 1 1 1 1 6 6 6 6 6 610101010 4 4 41212131313
  7 5 51414 214141414 1 1 1 1 6 6 6 6 61010101010 4
    5 51414141414141415151515 6 6 6 6101010101610
     141414141414141417171515 6 6 6 610      16
     141414141414141414171515 6 6    6
       14141414141414     15
         14    14
```

SUBCOMP.	COVER TYPE	ACRES	*	SUBCOMP.	COVER TYPE	ACRES
1	5. PP1 141+	151.1	*	10	3. PP1 51-100	93.3
2	5. PP1 141+	106.7	*	11	4. PP1 101-40	8.9
3	3. PP1 51-100	17.8	*	12	4. PP1 101-40	13.3
4	3. PP1 51-100	88.9	*	13	3. PP1 51-100	17.8
5	5. PP1 141+	111.1	*	14	5. PP1 141+	186.7
6	5. PP1 141+	177.8	*	15	4. PP1 101-40	40.0
7	3. PP1 51-100	22.2	*	16	5. PP1 141+	8.9
8	3. PP1 51-100	13.3	*	17	3. PP1 51-100	13.3
9	3. PP1 51-100	13.3	*			

TOTAL AREA 1084.4

*************** ACRES BY WORKING GROUPS ***************

PONDEROSA 1	PONDEROSA 2	LODGEPOLE
1084.4	0.0	0.0

DEFORESTED ACRES - 0.0

PAGE TYPE 5

BOGUS NATIONAL FOREST — TYPE AREAS OF COMPARTMENT NO. 206 — BLOCK NO. 1

COVER TYPE	ACRES	*	COVER TYPE	ACRES	*	COVER TYPE	ACRES
1 PP1 0-30	0.0	*	16	0.0	*	26 DEFOREST-B	0.0
2 PP1 31-50	0.0	*	17	0.0	*	27 DEFOREST-G	0.0
3 PP1 51-100	280.0	*	18	0.0	*	28 RECREATION	0.0
4 PP1 101-40	62.2	*	19	0.0	*	29 BARREN	0.0
5 PP1 141+	742.2	*	20	0.0	*	30 BRUSHLAND	0.0
6 PP2 0-30	0.0	*	21	0.0	*	31 RANGE-HERB	17.8
7 PP2 31-50	0.0	*	22	0.0	*	32 PRIVATE	66.7
8 PP2 51-100	0.0	*	23	0.0	*	33 RIGHTS/WAY	0.0
9 PP2 101-40	0.0	*	24	0.0	*	34	0.0
10 PP2 141+	0.0	*	25	0.0	*	35	0.0
11 LGP 0-30	0.0	*					
12 LGP 31-50	0.0	*					
13 LGP 51-100	0.0	*					
14 LGP 101-40	0.0	*					
15 LGP 141+	0.0	*					

TOTAL AREA 1168.9

BOGUS NATIONAL FOREST — SUBCOMPARTMENTS OF COMPARTMENT NO. 206 — BLOCK NO. 1

SUBCOMP.	COVER TYPE	ACRES	*	SUBCOMP.	COVER TYPE	ACRES
1	5. PP1 141+	151.1	*	10	3. PP1 51-100	93.3
2	5. PP1 141+	106.7	*	11	4. PP1 101-40	8.9
3	3. PP1 51-100	17.8	*	12	4. PP1 101-40	13.3
4	3. PP1 51-100	88.9	*	13	3. PP1 51-100	17.8
5	5. PP1 141+	111.1	*	14	5. PP1 141+	186.7
6	5. PP1 141+	177.8	*	15	4. PP1 101-40	40.0
7	3. PP1 51-100	22.2	*	16	5. PP1 141+	8.9
8	3. PP1 51-100	13.3	*	17	3. PP1 51-100	13.3
9	3. PP1 51-100	13.3	*			

TOTAL AREA 1084.4

*************** ACRES BY WORKING GROUPS ***************

PONDEROSA 1	PONDEROSA 2	LODGEPOLE
1084.4	0.0	0.0

DEFORESTED ACRES - 0.0

APPENDIX 4

An Example of Record Maintenance

Program GROW, listed below, is an example of the assistance provided by computers in the maintenance of records. Its purpose is to update inventory records if thinning or other change has not required replacement with a new record. New inventory data and updated data can then be combined for input to TEVAP2. The new management plan produced will be based on the most recent estimates of forest condition for all plots or subcompartments. The plan can be produced during the winter, between growing seasons, before it is needed to guide the next season's work.

Inputs to GROW are always original records, not the results of previous projections. A 9999 is punched instead of the year of record on inventory cards with updated information. Records with very large values for year will not be processed by the program. Accidental mixture of original and updated records will not be perpetuated for use by TEVAP2. This feature requires that two sets of inventory records be prepared for each working circle:

1. A permanent file of original data that is revised only by replacement of records. This file is revised continuously as work and inventory reports are submitted, and is the input file for GROW.

2. A temporary file consisting of data updated by GROW and of duplicates of original data that are too new to need updating. This file contains the inventory records to be used by TEVAP2.

Use of two files increases the complexity of the record system, but avoids the compounding of projection errors.

Linear projections are used in GROW because other forms of the relationships are unknown. For example, a 2-year increase in diameter is assumed to equal two-tenths of the increase projected by an equation developed for a 10-year period. Projection periods, the variable TIME in TEVAP2, should, therefore, be kept short, especially for fast-growing species.

GROW produces three kinds of output:

1. An inventory card with updated data is punched for direct use or for transfer to magnetic tape. Alternatively, the logical unit assigned to the punch may be assigned to a

tape drive. Card images of the temporary inventory file are then written directly onto tape.

2. A copy of the card or card image may be printed, if desired. A nonzero value of DUPL is read to obtain the printed record.

3. A record of the number of cards processed is written after all other operations have been executed. The total does not include any previously updated records accidentally mixed with original data.

As listed, the relationships in GROW apply to ponderosa pine in the Black Hills. Similar programs can be prepared for other species by replacing the species-specific statements with equivalents from section 3 of the appropriate species-specific subroutine of TEVAP2. Even the dwarf mistletoe rating can be updated. For lodgepole pine (Myers et al. 1971):

```
    IF (DMR .LE. 1.0) GO TO 100
    DMR = DMR + 0.07 * RINT(I)
    GO TO 105
100 DMR = DMR + (0.03 + 0.038 * DMR) *
    RINT(I)
```

```
      PROGRAM GROW
     1(INPUT,OUTPUT,PUNCH,TAPE5=INPUT,TAPE6=OUTPUT,TAPE7=PUNCH,TAPE4=TAP
     2E5)
C
C TO UPDATE INVENTORY IF NO CHANGES EXCEPT NORMAL GROWTH HAVE OCCURRED.
C
C DEFINITIONS OF VARIABLES NOT ALREADY DEFINED IN PROGRAM TEVAP.
C
C     ADD = NUMBER OF YEARS TO PROJECT INVENTORY DATA.
C     AND = YEAR AFTER LAST GROWING SEASON TO BE PROJECTED.
C     DUPL = INDEX TO PRINT (1) OR OMIT (BLANK OR 0) NEW DATA.
C     NBR = NUMBER OF INVENTORY CARDS PROCESSED.
C
      DIMENSION AGE(2),BAS(2),DATE(6),DBH(2),DEN(2),DMR(2),FAG(2),
     1FDEN(2),FOM(2),FOMR(2),FHT(2),FORET(19),HT(2),JDMR(2),JFAG(2),
     2JFDEN(2),JFOM(2),JFHT(2)
C
      KNTR = 0
      NBR = 0
C
C READ VALUES COMMON TO ALL CARDS.
C
      READ (5,1) (FORET(I),I=1,19)
    1 FORMAT (18A4,A2)
      READ (5,5) (DATE(I),I=1,6)
    5 FORMAT (6A4)
      READ (5,10) RINT,DUPL,ANO,NBK
   10 FORMAT (3F4.0,I4)
C
C INITIALIZE VARIABLES RECOMPUTED FOR EACH INVENTORY CARD.
C
   15 DO 20 I=1,2
      DMR(I) = 0.0
      FAG(I) = 0.0
      FDEN(I) = 0.0
      FOM(I) = 0.0
      FDMR(I) = 0.0
      FHT(I) = 0.0
      JDMR(I) = 0
      JFAG(I) = 0
      JFDEN(I) = 0
      JFOM(I) = 0
      JFHT(I) = 0
   20 CONTINUE
      SBAS = 0.0
C
C READ INVENTORY CARDS. LAST CARD IS BLANK TO STOP PROCESSING.
C INVENTORY RECORDS ARE ORIGINAL DATA, NOT RESULTS OF PREVIOUS
C PROJECTIONS. VARIABLE WHEN IS ACTUAL DATE, NOT DUMMY ADDED BY THIS
C PROGRAM.
C
      READ (4,25) IBK,KOMP,ISUB,QTR1,QTR2,SECT,TOWN,RANG,SITE,STRY,
     1NTYP,WORK,FISC,DBH(1),HT(1),DEN(1),AGE(1),DMR(1),DBH(2),HT(2),DEN(
     22),AGE(2),DMR(2),ACRE,WHEN
   25 FORMAT (I2,I4,I3,3A3,2A4,F3.0,F1.0,I2,F1.0,F4.0,F3.1,F3.0,F5.0,F3.
     10,F2.1,F3.1,F3.0,F5.0,F3.0,F2.1,F5.1,F4.0)
C
C DETERMINE IF GROWTH PROJECTION CAN BE MADE.
C
      IF(IBK .LE. 0 .OR. IBK .GT. NBK) GO TO 130
      JFISC = FISC
```

```
C
C TEST DATE OF DATA SO PROJECTED DATA WILL NOT BE PROJECTED AGAIN.
C
      IF(WHEN .GE. 2000.0) GO TO 15
      NBR = NBR + 1
      ADD = AND - WHEN
      IF(ADD .EQ. 0.0) GO TO 75
      IF(DEN(1) .EQ. 0.0 .OR. DBH(1) .EQ. 0.0) GO TO 75
C
C COMPUTE FUTURE STAND VALUES.
C
      BAS(1) = 0.0054542 * DBH(1) * DBH(1) * DEN(1)
      BAS(2) = 0.0054542 * DBH(2) * DBH(2) * DEN(2)
      SBAS = BAS(1) + BAS(2)
      DO 35 I=1,2
      IF(DBH(I) .EQ. 0.0) GO TO 35
      IF(DEN(I) .EQ. 0.0) GO TO 35
      FAG(I) = AGE(I) + ADD
      IF(DBH(I) .GE. 10.0) GO TO 28
      FDEN(I) = 0.00247 + 0.00124 * DBH(I) + 0.00028 * DBH(I) * DBH(I) +
     10.00000521 * SBAS * SBAS - 0.0000905 * DBH(I) * SBAS
      IF(FDEN(I) .LT. 0.0) FDEN(I) = 0.0
      FDEN(I) = DEN(I) * (1.0 - FDEN(I))
      GO TO 30
   28 FDEN(I) = DEN(I)
   30 FDM(I) = 0.88511 * DBH(I) + 1.29735 * ALOG10(HT(I)) + 0.00119 * DB
     1H(I) * SITE + 62.37174 / SBAS - 1.56975
      FHT(I) = 15.43021 + 1.107 * HT(I) - 0.08637 * AGE(I) - 304.12172 /
     1SITE - 0.02447 * SITE * SBAS * 0.01
   35 CONTINUE
C
C CHANGE ORIGINAL VALUES TO THOSE EXPECTED IN ADD YEARS.
C
      TEM = ADD / RINT
      DO 40 I=1,2
      FDEN(I) = DEN(I) + (FDEN(I) - DEN(I)) * TEM
      FDM(I) = DBH(I) + (FDM(I) - DBH(I)) * TEM
      FHT(I) = HT(I) + (FHT(I) - HT(I)) * TEM
   40 CONTINUE
C
C CHANGE TYPE CODES AS NEEDED.  REPLACE NTYP = 1 TO NTYP = 5 WITH
C VALUES OF NTYP APPROPRIATE TO SPECIES AND WORKING GROUP.
C
      J = 1
      IF(STRY .GT. 0.0) J = 2
      IF(FAG(J) .GT. 30.0) GO TO 45
      NTYP = 1
      GO TO 65
   45 IF(FAG(J) .GT. 50.0) GO TO 50
      NTYP = 2
      GO TO 65
   50 IF(FAG(J) .GT. 100.0) GO TO 55
      NTYP = 3
      GO TO 65
   55 IF(FAG(J) .GT. 140.0) GO TO 60
      NTYP = 4
      GO TO 65
   60 NTYP = 5
C
C CONVERT TO FIXED POINT FOR PUNCHING. RETAIN NECESSARY DECIMALS.
C
   65 DO 70 I=1,2
      JDMR(I) = FDMR(I) * 10.0 + 0.5
      JFAG(I) = FAG(I) + 0.5
      JFDEN(I) = FDEN(I) + 0.5
      JFDM(I) = FDM(I) * 10.0 + 0.5
      JFHT(I) = FHT(I) + 0.5
      FAG(I) = JFAG(I)
      FDEN(I) = JFDEN(I)
      FDM(I) = JFDM(I)
      FDM(I) = FDM(I) * 0.1
      FDMR(I) = JDMR(I)
      FDMR(I) = FDMR(I) * 0.1
      FHT(I) = JFHT(I)
   70 CONTINUE
      GO TO 85
   75 DO 80 I=1,2
      FAG(I) = AGE(I)
      FDEN(I) = DEN(I)
      FDM(I) = DBH(I)
      FDMR(I) = DMR(I)
      FHT(I) = HT(I)
      JDMR(I) = DMR(I) * 10.0 + 0.5
      JFAG(I) = AGE(I)
      JFDEN(I) = DEN(I)
      JFDM(I) = DBH(I) * 10.0 + 0.5
      JFHT(I) = HT(I)
   80 CONTINUE
   85 JSITE = SITE
      JSTRY = STRY
      JWORK = WORK
      JACRE = ACRE * 10.0 + 0.5
      JWHN = 9999
C
C PUNCH REPLACEMENT FOR INVENTORY CARD, USING NEW DATA.
C
      WRITE (7,90) IBK,KOMP,ISUB,QTR1,QTR2,SECT,TOWN,RANG,JSITE,JSTRY,NT
     1YP,JWORK,JFISC,JFDM(1),JFHT(1),JFDEN(1),JFAG(1),JDMR(1),JFDM(2),JF
     2HT(2),JFDEN(2),JFAG(2),JDMR(2),JACRE,JWHN
   90 FORMAT (I2,I4,I3,3A3,2A4,I3,I1,I2,I1,I4,2I3,I5,I3,I2,2I3,I5,I3,I2,
     1I5,I4)
C
C PRINT RECORD OF NEW INVENTORY DATA, IF DESIRED.
C
```

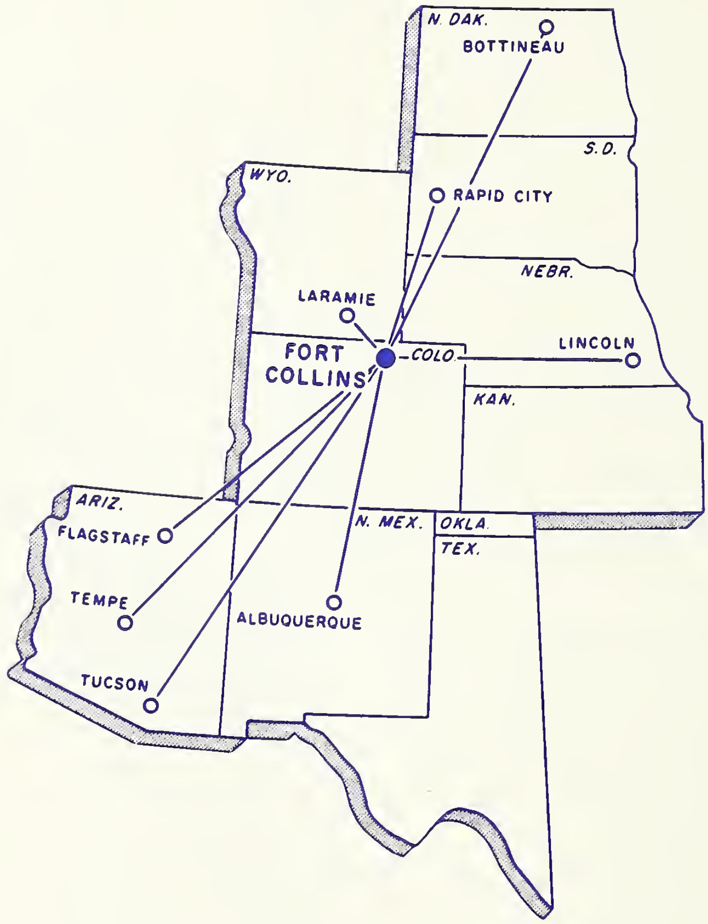
```
      IF(DUPL .EQ. 0.0) GO TO 15
      IF(KNTR .EQ. 50) KNTR = 0
      IF(KNTR .NE. 0) GO TO 120
      WRITE (6,100) (DATE(K),K=1,6)
  100 FORMAT (1H1,//,43X,39HRESULTS OF PROJECTION OF INVENTORY DATA/1H ,
     142X,18HDATA PROJECTED TO ,6A4)
      WRITE (6,105) (FORET(I),I=1,19)
  105 FORMAT (1H0,8X,18A4,A2)
      WRITE (6,110)
  110 FORMAT (1H0,53X,29H**********OVERSTORY**********,1X,29H*********UN
     1DERSTORY**********,10X,5HORIG./1H ,2X,5HBLOCK,2X,4HCOMP,2X,4HSUBC,
     22X,4HSITE,2X,5HSTORY,2X,4HTYPE,2X,4HWORK,3X,4HFISC,3X,3HDBH,3X,2HH
     3T,3X,5HTREES,3X,3HAGE,2X,3HDMR,3X,3HDBH,3X,2HHT,3X,5HTREES,3X,3HAG
     4E,2X,3HDMR,4X,4HAREA,3X,4HDATE)
      WRITE (6,115) IBK,KOMP,ISUB,SITE,STRY,NTYP,WORK,FISC,FDM(1),FHT(1)
     1,FDEN(1),FAG(1),DMR(1),FDM(2),FHT(2),FDEN(2),FAG(2),DMR(2),ACRE,WH
     2EN
  115 FORMAT (1H0,3X,I2,5X,I3,3X,I2,F7.0,F6.0,4X,I2,F7.0,F7.0,F6.1,F6.1,
     1F8.0,F6.0,F4.1,F6.1,F6.1,F8.0,F6.0,F4.1,F9.1,F7.0)
      KNTR = KNTR + 1
      GO TO 15
  120 WRITE (6,125) IBK,KOMP,ISUB,SITE,STRY,NTYP,WORK,FISC,FDM(1),FHT(1)
     1,FDEN(1),FAG(1),DMR(1),FDM(2),FHT(2),FDEN(2),FAG(2),DMR(2),ACRE,WH
     2EN
  125 FORMAT (1H ,3X,I2,5X,I3,3X,I2,F7.0,F6.0,4X,I2,F7.0,F7.0,F6.1,F6.1,
     1F8.0,F6.0,F4.1,F6.1,F6.1,F8.0,F6.0,F4.1,F9.1,F7.0)
      KNTR = KNTR + 1
      GO TO 15
C
C RECORD THAT THE CHANGES WERE MADE.
C
  130 IF(DUPL .EQ. 0.0) GO TO 140
      WRITE (6,135) NBR
  135 FORMAT(1H0,//,5X,27HNUMBER OF CARDS REPUNCHED- ,I5)
      GO TO 200
  140 WRITE (6,145)
  145 FORMAT (1H1,////,43X,38HRECORD OF PROJECTION OF INVENTORY DATA)
      WRITE (6,150) (FORET(I),I=1,19)
  150 FORMAT (1H0,/,43X,16HSOURCE OF DATA- ,18A4,A2)
      WRITE (6,155) (DATE(I),I=1,6)
  155 FORMAT (1H0,/,43X,18HDATA ADJUSTED TO- ,6A4)
      WRITE (6,160) NBR
  160 FORMAT (1H0,/,5X,27HNUMBER OF CARDS REPUNCHED- ,I5)
  200 CALL EXIT
      END
```

RESULTS OF PROJECTION OF INVENTORY DATA
DATA PROJECTED TO JANUARY 2, 1974

BOGUS NATIONAL FOREST

								**********OVERSTORY**********					*********UNDERSTORY**********						ORIG.
BLOCK	COMP	SUBC	SITE	STORY	TYPE	WORK	FISC	DBH	HT	TREES	AGE	DMR	DBH	HT	TREES	AGE	DMR	AREA	DATE
1	1	1	40.	0.	3	2.	1974.	5.9	33.0	811.	82.	0.0	0.0	0.0	0.	0.	0.0	0.0	1965.
1	1	2	60.	0.	4	0.	-0.	12.5	59.0	125.	125.	0.0	0.0	0.0	0.	0.	0.0	0.0	1968.
1	1	7	40.	0.	5	4.	1976.	9.4	48.0	315.	153.	0.0	0.0	0.0	0.	0.	0.0	0.0	1967.
1	2	5	50.	1.	3	5.	1974.	12.7	59.0	2.	128.	0.0	5.4	44.0	615.	78.	0.0	8.9	1966.
1	2	9	70.	0.	4	4.	1974.	14.9	85.0	70.	138.	0.0	6.9	63.0	125.	78.	0.0	173.3	1966.
1	2	13	60.	0.	26	1.	1974.	0.0	0.0	0.	0.	0.0	0.0	0.0	0.	0.	0.0	0.0	1965.
1	3	1	50.	1.	3	6.	1974.	12.3	49.0	2.	126.	0.0	5.4	34.0	846.	77.	0.0	364.4	1967.
1	3	6	70.	0.	26	1.	1975.	0.0	0.0	0.	0.	0.0	0.0	0.0	0.	0.	0.0	0.0	1967.
1	3	10	60.	0.	3	0.	-0.	11.0	62.0	204.	98.	0.0	0.0	0.0	0.	0.	0.0	320.0	1968.
1	6	1	60.	0.	4	0.	-0.	10.4	63.0	235.	108.	0.0	0.0	0.0	0.	0.	0.0	0.0	1966.
1	7	10	50.	0.	3	2.	1975.	5.4	32.0	653.	54.	0.0	0.0	0.0	0.	0.	0.0	0.0	1968.
1	9	14	50.	0.	3	2.	1977.	6.4	34.0	417.	56.	0.0	0.0	0.0	0.	0.	0.0	0.0	1967.
2	98	1	50.	0.	2	0.	-0.	4.6	22.0	597.	38.	0.0	0.0	0.0	0.	0.	0.0	0.0	1966.
2	98	4	60.	0.	3	2.	1974.	6.4	51.0	1083.	77.	0.0	0.0	0.0	0.	0.	0.0	0.0	1965.
2	98	13	60.	0.	4	0.	-0.	10.7	68.0	238.	133.	0.0	0.0	0.0	0.	0.	0.0	0.0	1966.
2	99	4	60.	0.	1	0.	-0.	0.0	3.0	580.	10.	0.0	0.0	0.0	0.	0.	0.0	0.0	1967.
2	100	2	50.	0.	4	0.	-0.	9.6	57.0	203.	123.	0.0	0.0	0.0	0.	0.	0.0	0.0	1967.
2	100	4	50.	0.	1	0.	-0.	3.1	14.0	1968.	25.	0.0	0.0	0.0	0.	0.	0.0	17.8	1969.
2	100	5	60.	0.	3	4.	1975.	12.0	59.0	198.	89.	0.0	5.5	50.0	288.	69.	0.0	0.0	1965.
2	100	7	60.	0.	4	0.	-0.	10.8	71.0	238.	129.	0.0	0.0	0.0	0.	0.	0.0	0.0	1965.
2	100	9	60.	0.	4	6.	1974.	12.7	71.0	3.	129.	0.0	7.3	54.0	498.	79.	0.0	0.0	1965.
2	100	16	50.	0.	5	4.	1977.	14.0	61.0	101.	148.	0.0	0.0	0.0	0.	0.	0.0	0.0	1965.
2	101	2	50.	1.	3	0.	-0.	12.6	57.0	1.	129.	0.0	8.2	48.0	289.	89.	0.0	0.0	1965.
2	102	2	50.	1.	2	6.	1978.	14.5	56.0	10.	125.	0.0	2.5	25.0	2942.	41.	0.0	8.9	1968.
2	102	9	60.	0.	4	5.	1974.	14.3	66.0	44.	135.	0.0	7.3	43.0	342.	65.	0.0	53.3	1969.
3	202	1	40.	0.	5	4.	1988.	11.7	50.0	76.	157.	0.0	0.0	0.0	0.	0.	0.0	66.7	1968.
3	208	2	60.	0.	5	5.	1979.	12.4	75.0	76.	155.	0.0	4.5	51.0	672.	75.	0.0	0.0	1969.
3	207	10	70.	0.	5	4.	1978.	17.7	90.0	36.	157.	0.0	0.0	0.0	0.	0.	0.0	0.0	1965.
3	203	11	60.	0.	3	2.	1976.	5.8	55.0	976.	85.	0.0	0.0	0.0	0.	0.	0.0	0.0	1965.
3	203	9	60.	0.	4	0.	-0.	7.8	67.0	370.	112.	0.0	0.0	0.0	0.	0.	0.0	0.0	1967.
3	203	7	60.	0.	4	2.	1978.	9.8	64.0	387.	119.	0.0	0.0	0.0	0.	0.	0.0	0.0	1965.
3	203	5	50.	0.	5	6.	1979.	14.2	60.0	35.	165.	0.0	3.3	31.0	2194.	55.	0.0	40.0	1969.
3	203	3	70.	0.	3	2.	1976.	8.6	67.0	441.	89.	0.0	0.0	0.0	0.	0.	0.0	0.0	1965.
3	203	2	60.	0.	4	2.	1977.	8.8	66.0	390.	114.	0.0	0.0	0.0	0.	0.	0.0	0.0	1965.
3	203	1	50.	0.	5	4.	1988.	11.9	57.0	124.	148.	0.0	0.0	0.0	0.	0.	0.0	31.1	1968.
3	202	9	60.	0.	3	2.	1979.	3.1	41.0	4665.	59.	0.0	0.0	0.0	0.	0.	0.0	0.0	1965.
3	202	8	50.	0.	4	0.	-0.	10.7	58.0	67.	119.	0.0	2.7	29.0	1084.	49.	0.0	0.0	1965.
3	202	7	60.	0.	3	2.	1988.	5.6	33.0	844.	56.	0.0	0.0	0.0	0.	0.	0.0	13.3	1968.

NUMBER OF CARDS REPUNCHED-   38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